New directions in the political economy of money complexity, knowledge, and institutions

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New Directions in the Political Economy of Money:

Complexity, Knowledge, and Institutions

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'The definitions, or descriptions, that have been applied to money are legion. They range from those which carry the implication that it is the root of all evil to those that regard it as manna from heaven. Some have argued that it does not matter, others that it matters too much. Money has been described as a political, or sociological, phenomenon, as a mechanism, as a mirror, as a religion, as a myth, as a means of communication which reduces complexity and as a distortion which increases it, as the curse of the miser and the elixir of the spendthrift, as a means to all ends and as an end in itself, as barren and as all-powerful, as inert or neutral, and as "the drink which stimulates the economic system to activity," as the tool of social progress and as an obstacle to it. . . . Such definitions, descriptions, implications, or epithets always imply or involve a moral or philosophical issue. This is not generally recognized because Cartesian forms of thought still dominate our thinking'.

S. Herbert Frankel, 1977, 2.

Abstract

This thesis deals with the complex and epistemic role of money and its surrounding institutions. It studies the relations among money, monetary institutions, the contextualized formation of macroeconomic phenomena, and the emergence of knowledge. It makes three relevant contributions: first, it explores the analytical and methodological implications of the link between the use of money and different monetary institutions in determining the formation of knowledge. As such, it emphasizes the emergence of different macroeconomic phenomena conditioned on monetary institutions' distinctive epistemic and incentive properties. Second, it presents a new political economy and institutionalist framework within macroeconomics to assess different monetary institutions in order to identify their: a) relative robustness and b) plausible institutional 'inevitability' and entangled political evolution. Third, it sheds light on the need for an orderly set of monetary relations and associated systems of neutral monetary policy and robust rules, necessary for sustaining a social order. In sum, this dissertation delineates a novel institutionalist subdiscipline of macroeconomics that recognizes and deals with emergence, complexity, entangled evolution, and the rationale for central banks.

This work is divided into three main sections, comprising six chapters: Part I examines the analytical relation between the notion of organized complexity and macroeconomics, as well as its implications for methodology and macroeconomic inquiry. It also explores the epistemic role of money as an orderly system of social relations, money's fundamental role in generating epistemic complexity, and how its use is indivisible from a macroeconomic complex order. In Parts II and III, the complexity-based research agenda is translated into two self-standing yet interrelated research inquiries delving deeper into the political economy of money. They explore the institutional implications of money and the need for robust monetary constitutions. More specifically, Part II examines the institutional evolution of central banks and their alleged 'institutional rationale.' It combines a scrutiny of the theoretical justifications for central banks with a historical analysis of their entangled political evolution. Together these analyses reveal that there is no strong institutional rationale for central banks' apparent inevitability. The framework of robust political economy is extended to monetary theory in Part III, which scrutinizes monetary alternatives that could be robust for 'managing' money and overcoming knowledge and incentive problems in monetary policy. It specifically undertakes institutional comparisons of diverse monetary systems, primarily central banking versus free banking. Finally, the three sections propose a heterodox institutional research agenda in macroeconomics to identify robust institutions, contrasted with the fragility and politically entangled evolution of central banks.

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Preface

Macroeconomics in a Vacuum: Formal Models of Imaginary Worlds

> 'There cannot be intrinsically a more insignificant thing, in the economy of society, than money . . . It is a machine for doing quickly and commodiously, what would be done, though less quickly and commodiously, without it: and like many other kinds of machinery, it only exerts a distinct and independent influence of its own when it gets out of order'.
>
> John Stuart Mill, 1929 [1848], 488

Why are money and monetary institutions so fundamental in coordinating economies based on decentralized interactions and freedom of exchange? How can money, as Mill suggests in the quote above, be 'out of order', and what are its effects on coordination and on the overall economy? Do monetary institutions, and the way they are designed (their rules, incentive structures, and procedures), have substantial influence in the way money can potentially get 'out of order'? And finally, do institutions, which 'govern' the supply (creation) of money, have any meaningful role in explaining the recurrence of crisis and coordination failures?

Or to frame the question differently, are economic crises simply unavoidable and inherent features of capitalism—as Marx (1973 [1939]) claimed—or are they really phenomena *conditioned* to a specific monetary institutional context? And ultimately, are money and its institutions—rather than market failures and animal spirits—the most important elements in explaining the macroeconomy's complexity and the emergence of crisis? These are some of the fundamental questions I will seek to address throughout this work, by using a broader conception of macroeconomics and political economy based on the ideas of organized complexity, emergent knowledge, institutional analysis, and their relationships with robust political economy (RPE).[1]

Specifically, this thesis deals with three pressing challenges related to suitable economic methodologies, complex macroeconomic phenomena, and banking institutions. In a simple phrase, it deals with some crucial yet neglected problems related to the most suitable methods for macroeconomic analysis, the epistemic and complexity-based role of money in society, and finally, the monetary institutions that affect how money operates within such a complex system. These three major and contemporary challenges for macroeconomics can be also framed as a series of important research questions that have been greatly neglected by modern macroeconomics, and they will be the core focus in this work. Hence in what follows, I will describe what can be gained by paying attention to alternative (non-mainstream) approaches to macro, the three major relevant research questions that guide the intellectual endeavor of this work, followed finally by a detailed examination of the major themes developed throughout this thesis in order to address them.

The rest of this preface will proceed as follows: First, it will propose some fruitful ways forward,

[1] RPE provides an analytical framework or approach for doing comparative institutional analysis, in which the institutions to be compared are examined to see how *in reality* they can function in order to overcome social, collaborative, and economic dilemmas—even when there are unfavorable conditions about the knowledge, information, and incentives that decision-makers, within those institutions, face explicitly in them (Leeson and Subrick, 2006; see chapter 6). Institutional robustness relates to 'institutional success', meaning 'institutions that enable individuals to achieve productive outcomes in situations where temptation to free-ride and shirk are ever present' (Ostrom, 1990, 15).

complementarities, and some plausible relations (theory bridge-building) between contemporary macroeconomics and this work, so that mainstream macroeconomists can be more captivated and incentivized in gaining insights from alternative and institutionalist approaches to macro. Thus, the first part of this preface seeks to show to mainstream practitioners what can be gained—intellectually—by paying attention to alternative and heterodox approaches to money and monetary institutions. The second section will describe the three major research questions that will be addressed throughout this thesis and that motivate the entire intellectual endeavor of this work. Second, it will outline the major themes explored throughout the six chapters that comprise this thesis, in order to shed light on and address those specific research questions.

Third, the preface will provide theoretical justifications and arguments for focusing on money as a crucial element of analysis within the fields of political economy and macroeconomics. Fourth, it will describe in depth the major themes of complexity, knowledge, and monetary institutions and how they analytically relate to the relevant research questions that motivate this work; and then it will give a brief description of the major contributions of this dissertation.[2] Finally, the preface will conclude by suggesting a novel complexity-based approach and institutional research agenda for macroeconomics that is more capable of addressing the key properties of the macroeconomy as an organized complex system and hence better able also to address the relevant research questions related to money and posited in this work.

Fruitful Bridges Between Contemporary Macro and Alternative Approaches

The aforementioned broad challenges for macroeconomics can be translated into a series of research questions that will guide the overall intellectual endeavor of this work, and that can be of great interest also for mainstream macroeconomists. The more general and encompassing research question therein is the fundamental problem concerning why money matters in commercial societies—in other words, what the economic and institutional implications are of the use of money in commercial societies. Money as an institution seems to be extremely important for the correct workings of commercial and market-based societies, yet its fundamental coordinative and epistemological role has not been entirely understood (Dyer, 1989; Smithin, 2003). In other words, the social sciences in general, and political economy in particular, have long recognized that money is a crucial institution for market-based societies (Marx, 1964; Smith, 1981 [1776]); yet paradoxically, we have no compelling and systematic explanations of the fundamental reasons why money is so important (Horwitz, 1992a, 1992b).

This lack of a consistent and compelling explanation of why money matters in commercial societies and in the macroeconomy at large seems to be one of the underlying reasons why macroeconomics, as a discipline, has largely forgotten about money and its important implications (Laidler, 2004; Smithin, 2000). Consequently, this thesis can be interpreted as a broad attempt to provide tentative answers to the above fundamental question and hence why they should be, once again, a fundamental focus of scientific attention for both macroeconomics and political economy. Put differently, the six chapters that comprise this work are complementary and overlapping attempts to provide answers to the fundamental question of whether money and its surrounding institutions matter in determining (both positive and negative) macroeconomic phenomena.

This broad research question about money and its institutional implications for commercial societies can be subsequently broken down into three more specific research questions that will be addressed in the three major parts of this work, part I, part II, and part III. Taken together, these three more specific

[2] Institutions are conceived throughout this work as 'the humanly devised constraints that structure human interaction. They are made up of formal constraints (e.g., rules, laws, constitutions), informal constraints (e.g., norms of behavior, conventions, self-imposed codes of conduct), and their enforcement characteristics. Together they define the incentive [and epistemic] structure of societies and specifically economies' (North, 1994, 360; see also Ostrom, 2005). Alas, it should be acknowledged that North's conception of institutions is considered by some unclear and has also been criticized recently by other institutional economists (Hodgson, 2006); furthermore, there has been recent attempts to provide a more refined discussion on how institutions should be defined, see for example Guala's (2016) recent arguments concerning how institutions should be defined.

research questions are complementary attempts at providing different theoretical and institutional answers to the more general question about the crucial role of money and its surrounding institutions in commercial societies. Thereafter, the first more specific research question concerns the complexity-based and epistemic role of money. In other words, how does money affect the emergent and complex macroeconomic order? Put differently, why does money, as an institution, matter in the emergent coordinative process of the market?

Ever since Hayek's famous essays on money prices and knowledge (Hayek, 1948 [1937], 1948 [1945]), not much work has focused on the fundamental role that money plays in coordinating the scattered knowledge in society. Moreover, recent work has focused merely on the rather communicative or almost 'linguistic-like' role of money in conveying the *already-existent* tacit knowledge available in society (Horwitz, 1992b). However, recent explorations in complexity theory and social ontology have suggested that interactive social systems, which are based on orderly systems of relations, generate emergent epistemic properties that are irreducible to the already-existent informational properties of the system (Hodgson, 2000b; Lawson, 2012; Paniagua, 2018a). Thus these two fundamental ideas about money and organized complexity seem to be on conflicting theoretical terms with each other (Lawson, 2016). Thus, a relevant challenge for the first part of this thesis is to find a theoretical way forward, or framework of analysis, through which we can reconcile these ideas about epistemology, money, social ontology, and emergence and consequently, to expand further our narrow understanding of the crucial role of money in society.

Given the above gaps in monetary research, a fundamental question for social theory in general, and for monetary theory in particular, arises: does money truly play a communicative or 'disseminating' role in society? Or rather, could money potentially play a more relevant role in generating an orderly complex system through which the coordinative properties of the market arise as *emergent properties* of such a system of monetary relations? These tensions lead also to a second more specific research question: do money and language differ in any meaningful manner as media of social relations? Alas, modern macroeconomics, with its isolated and utility-maximizing representative-agent models, has nothing meaningful to say on these fundamental issues related to money, emergence, and organized complexity (Kirman, 1992, 2010). Modern macroeconomic approaches have relied too heavily upon reductionist assumptions and formalist methods; and consequently, they are unfortunately silent on these relevant and pressing issues related to complexity, epistemology, and money (Horwitz, 1992a). Thus, there is no wonder why macroeconomists have been so confused and puzzled about the underlying and fundamental causes of the 2008–9 Great Recession (Caballero, 2010; Calvo, 2013; Romer, 2016).

For instance, Calvo has recently commented, 'Conventional monetary theory obliterates the central role played by media of exchange in the workings and instability of capitalist economies'; pressing issues about the role of money in economic crises 'have been ignored in conventional theory . . . This is very strange because disregard for these key [monetary] issues has lasted for more than half a century' (Calvo, 2013, 3). These remarks have been further underscored by Caballero (2010), which stated that:

> [T]he current core of macroeconomics—by which I mainly mean the so-called dynamic stochastic general equilibrium approach—has become so mesmerized with its own internal logic that it has begun to confuse the precision it has achieved about its own world with the precision that it has about the real one. This is dangerous for both methodological and policy reasons. On the methodology front, macroeconomic research has been in "fine-tuning" mode within the local-maximum of the dynamic stochastic general equilibrium world, when we should be in "broad-exploration" mode. We are too far from absolute truth to be so specialized and to make the kind of confident quantitative claims that often emerge from the core. On the policy front, this confused precision creates the illusion that a minor adjustment in the standard policy framework will prevent future crises, and by doing so it leaves us overly exposed to the new and unexpected. (Caballero, 2010, 85; see also Romer, 2016)

Hence current macroeconomic approaches are unable to shed light upon the aforementioned issues related to money, emergent properties, and the features of organized complexity—all features that seem to be actually relevant in order to illuminate the fundamental emergent and coordinative role of money in society (Lawson, 2016; see also chapter 1). Ever since the 2008 Great Recession there has been a growing dissatisfaction concerning the way in which macroeconomics has been performed. This has been even recognized by the most mainstream and prestigious practitioners of macroeconomics (Romer, 2016).

As Caballero has recognized in the quote above, the fundamental problem with mainstream macroeconomics is that contemporary approaches have begun to consider that the only legitimate way to shed light on macroeconomic phenomena, is through either neoclassical growth models or stochastic general equilibrium approaches. Alas, in such a zealous process concerning the most appropriate methods to understand macroeconomic reality, modern practitioners have begun to confound their preferred methods with macroeconomic reality itself. Hence mainstream macroeconomics is at the danger of confusing 'the precision it has achieved about its own world with the precision that it has about the real one' (Caballero, 2010, 85). This is problematic for two reasons: first, it has misled mainstream practitioners to believe that their preferred approaches are the only plausible and legitimate way to understand macroeconomic reality; and second, it has misled them to believe that the world represented by those models is in fact the real world, and thus, that no further alternative explorations are required to enrich their worldview. I consider that narrow form to engage with scientific explorations utterly misguided.

These two effects have significantly impoverished macroeconomics as a discipline, proscribing it to engage fruitfully with alternative and non-formalist approaches that could enrich the manner in which macroeconomists fully understand money and monetary institutions. As Caballero (2010) suggests, mainstream practitioners should be less concerned about 'fine-tunning' their own mainstream models — which allegedly have achieved their maximum total utility (Romer, 2016)—, and thus be more concerned with 'broader explorations' about how to best understand macroeconomic reality, and finally to rekindle macroeconomics as a discipline. Hence, in part, this work is an invitation for mainstream practitioners to engage fruitfully with alternative approaches to money and monetary institutions from a social-epistemic and emergentist perspective.

This thesis examines macroeconomic phenomena from an analytical framework different from the mainstream modelling approach and based on theories of complex systems, institutional analysis, and social epistemology. Thus, in contrast to conventional approaches based on aggregation and formal stochastic general equilibrium models, the approach suggested in this work is one in which macroeconomic entities are generated and constituted by *both* the network of monetary interactions established by the agents and also by the adjacent monetary institutions in charge of producing the medium of exchange. The non-linear and complex combination of these two elements allows the emergence of economic phenomena which are irreducible to the micro parts, yet largely affected by the institutions which produce money. The resulting difference in analytical perspectives is substantial: the macro level of society *cannot* be either represented or attain by processes of aggregation over the micro entities which neglect also the role of money as a socio-interactive mechanism (Wagner, 2020). To the contrary, the micro-macro relation is treated as a complex one of parts-to-emergent-whole, and this nonlinear relation is analyzed via a socio-epistemic and institutionalist scheme of thought.

Ultimately, from this perspective, the macroeconomy is a complex epistemic network, generated by agents interacting through monetary exchanges. However, such an emergent epistemic-monetary system, cannot be reducible either to a single "representative" plan, performed by a single "representative agent", or to the aggregation or sum of the agents' different plans. Hence my approach suggested here, treats macroeconomic theory as a form of systems theory, or as a theory of money-using society, which has been organized through monetary interactions and money-producing institutions. In other words, the main difference between the systems-theoretic or social-theoretical approach suggested here and the

mainstream approach to macro is that:

> Conventional macro theory presents a national economy as a collection of such aggregate variables as output, employment, investment, and a price level, and seeks to develop theoretical relationships among those variables. In contrast, the social-theoretic approach to macro or social theory … treats the standard macro variables as *having been shaped through* social institutions, conventions, and processes that in turn are generated through interaction among economizing persons. The relation between micro and macro levels of analysis is a relationship between the parts of something and the entirety of that thing. … The object denoted as macro is thus of a higher order of complexity than the object denoted as micro. (Wagner, 2020, vii)

Thus, standard macroeconomic approaches, equipped either with neoclassical growth models or stochastic general equilibrium models, treat the micro-macro relationship as simply *scalable*: with macro variables represented as being mere aggregations over, or scaled-up versions of, micro variables (Kirman, 1992, 2010). In consequence, the standard approach to macroeconomics, deemphasizes the unique role of money in producing novel epistemic complexity in society, thus deemphasizing also the role of monetary institutions in ultimately generating, and deeply affecting, such a monetary-epistemic order. In contrast, the systems-theoretic approach sketched throughout this work, portraits the relationship between micro and macro as a complex and *non-scalable* relationship, that rather entails an ontological transformation of economic phenomena throughout the unique use of money and institutions. There is a complexity and ontological transformation which occurs from the micro level to the macro level of society, exclusively throughout the use of money in society. As I will show in chapters 1 and 2, this complexity-based transformation is clarified further by complexity theory and by social epistemology.

From this alternative view, macro phenomena are actually richer and more complex phenomena: the emergent products of monetary-epistemic interactions, and so they entail novel and irreducible societal properties. This alternative approach proposed treats macro theory as a form of systems theory in which the behavior of the entire system has novel properties that are not reducible to, nor explicable by, the properties of individual elements which composed the order. In other words, the approach suggested here seeks to expand and enrich the current reductionist and narrow vision concerning what the macroeconomic order ultimately consists and how it can be generated. Standard macroeconomists thus can gain an entirely different perspective about how the macroeconomic order is ultimately produced, by shedding light on the epistemic role of money and its surrounding institutions. This can enrich the manner in which contemporary macro is currently being performed, thus, encouraging also what Caballero (2010) has identified as a healthy and valuable "broad-exploration" mode in economic inquiry.

Therefore, these new directions in the political economy of money could be extremely valuable to mainstream macroeconomists by pointing out certain areas of macroeconomic reality and its causal properties that have been disregarded by the standard framework which reduces the macro variables as simple aggregations over micro variables. Hence mainstream macroeconomists can gain a more accurate picture about the fundamental epistemic role of money in society and its surrounding institutions, by paying attention to macro phenomena through a social-epistemic and institutionalist perspective. Ultimately, by paying attention to emergent properties and social epistemology, mainstream macroeconomists can also get a more accurate view and a better (non-formal) explanation about why money is fundamental in order to sustain an economic order, and how money could also become—paradoxically—an element of discoordination and disorder. This novel socio-epistemic and complexity vision of money, posited in this work, thus allows mainstream macroeconomists to grasp why money should be interpreted as a kind of unique "double-edged sword" system of social relations; finally, providing compelling reasons as to why a vital concern for macroeconomists going forward should be a thorough comparative institutional analysis of monetary and banking institutions.

Similarly, new monetarists macroeconomists (or Market Monetarists) can also gain considerably from this work by reflecting upon a different perspective on topics such as monetary policy rules and macroeconomic stabilization. Broadly speaking, market monetarists consider that all that is required in order to attain macroeconomic stability is to establish a stable and credible nominal expenditure (aggregate demand or MV) rule, that can be maintained by a central bank governed by experts. Thus, a nominal expenditure rule (or a form of nominal anchor related with aggregate demand), is considered by market monetarists as a *sufficient* condition to attain macroeconomic stability. This work, grounded on complexity and social epistemology, proposes certain challenges to the Market Monetarist literature and to such an aggregated (top-down) way of perceiving macroeconomic stability, which could fruitfully help to develop finer lines of argument going forward and also help those macroeconomists to clarify their specific policy proposals.

In short, the emergentists approach, undertaken throughout this work, suggests two important things for the Market Monetarist literature going forward: first, that macroeconomic stability arises *indirectly*—as an emergent phenomenon—through the interactions between monetary institutions, monetary rules under non-ideal conditions, and the agents' interactions performed through money; thus, macroeconomic stability can only be attained through dynamic processes from the micro level toward the macro level via robust monetary institutions and how they ultimately affect monetary exchanges. This bottom-up and institutionally contingent view concerning macroeconomic stability challenges the notion that stability could be attain and design merely by imposing a top-down form of nominal stability from the macro-level toward the micro-level disassociated from the processes of exchange. Second, that nominal income stability rules (or NGDP rules) should be considered as a *subset* of a wider group of plausible monetary institutions that could achieve, in different ways, macroeconomic stability.

Consequently, stable nominal expenditure rules should be scrutinized institutionally, and compare against other plausible monetary institutions, in order to understand which ones are relatively more robust and batter able to cope with several epistemic and incentive problems inherent in *non-ideal* monetary policy making. To conclude, Market Monetarists, similarly to mainstream macroeconomists in general, can therefore gain substantial political economic and institutional insights concerning money, emergent macro properties, and the relative robustness of different institutions; lastly, greatly enriching also their technocratic, and rather narrow, view about monetary stability and the macroeconomic reality at large.

Some Neglected Yet Relevant Research Questions for Macroeconomics

Consequently, and in order to build those aforementioned fruitful connections and intellectual bridges between mainstream macro and alternative approaches, part I of this work seeks to shed light on those aforementioned research questions about the decisive (complexity-based) role of money in society by exploring two major themes related to organized complexity and emergent properties in macroeconomic phenomena. Specifically, these research questions will first be tackled by exploring the crucial analytical and methodological challenges that the properties of organized complexity in general pose to macroeconomic analysis in particular, in addition to the potential analytical tensions between the notion of organized complexity and modern macroeconomic approaches. I will argue in chapter 1 that the macroeconomy truly resembles, and possesses the core features of, an organized complex system; accordingly, political economists need to find alternative methods of analysis that are more capable of dealing with the crucial properties of complexity (Hodgson, 2000b; Lewis and Wagner, 2017).

Part I of this work therefore starts in chapter 1 by exploring the methodological relationship (and tensions) between organized complexity and macroeconomics by suggesting that conventional macroeconomic approaches obliterate all the relevant aspects and core properties that characterize macroeconomic phenomena that stem from the use of money in organized market relationships. Subsequently, by borrowing from the aforementioned insights about complexity theory and its methodological relationship with macro phenomena, chapter 2 also explores the complexity-based role of money in the generation

of economic knowledge as an emergent property irreducible to the existent and scattered knowledge already present in society. Finally, throughout the exploration of these themes related to methodology, organized complexity, and the emergent role of money in society, part I as a whole ultimately attempts to shed light on the crucial—yet neglected—research question concerning why money matters in determining complex macroeconomic phenomena? Interestingly, attempting to shed light on this pressing research question will also lead us to recognize that not only does money matter, but money's crucial relevance in society is *indivisible* also from the surrounding monetary institutions that sustain, affect and guide its production (Smithin, 2004).

Given the above recognition, the second relevant research question therefore concerns the monetary institutions that can actually produce (and affect) the medium of exchange. It consequently concerns the actual institutional implications of the crucial use of money in society. As explained above, money is the main subject matter of this work; however, the use of money in society is directly related also to the banking institutions that broadly affect (and guide) its production. The individuals in society do not produce money effortlessly and endogenously (unlike language); and consequently, they have to rely on additional (and exogenous) banking institutions for its production (Horwitz, 1992a; Ingham, 2000). Particularly relevant among these banking institutions are central banks (Goodhart, 1987; 1988; 2010; Smithin, 2004). This creates a two-tiered system in which monetary institutions—such as central banks—broadly create and guide money's production. Subsequently individuals can engage in monetary relations that create the emergent order discussed throughout part I (Ingham, 2000; Smithin, 2003).

Hence, since individuals do not produce money by themselves effortlessly, the analytical focus of attention in this work naturally has to transition toward the relevant monetary institutions engaged in its production (Horwitz, 2000; Smithin, 2004). Consequently, the analytical focus of attention will move toward analyzing and scrutinizing the relevant role of central banks. Specifically, the second research question that will be addressed in this thesis is the following: are central banks the only 'natural' and inherent institutional evolutionary outcome of monetary and banking systems? Or as Schwartz (1993) once rhetorically asked: 'Are Central Banks [inherently] necessary?' Put differently, what is the core economic rationale for the need for, and potentially 'natural' institutional evolution of, central banks?

Consequently, part II will focus on analyzing the most important banking institutions that affect and guide money's production and consequently that determine also—at the institutional or preconstitutional level—the emergent, complex macroeconomic order. In part II, the focus therefore will shift toward addressing the aforementioned second relevant research question of this thesis concerning the alleged inherent banking role for, and natural evolution of, central banks within the economic order. Particularly relevant here will be scrutinizing the theoretical arguments and the historical evidence provided by Goodhart (1987; 1988) and other banking scholars (see for example Congdon, 1981 and Giannini, 2011) for justifying the inherent need for, and 'natural' evolution of, central banks within resilient banking systems (see also Paniagua, 2019b).

Accordingly, if we care about studying money and the emergent macroeconomy at large, then we should also study the institutional properties of central banks and their historical and institutional evolution within the monetary system (Goodhart, 2010; Smithin, 2004). If we consider monetary institutions and their (epistemic and incentive) properties as relevant aspects within macroeconomic analysis under a complexity-based orientation of macroeconomics (Colander and Kupers, 2014), then the study of central banks should also become a crucial theoretical and analytical aspect in our attempts to provide a complexity-based framework for analyzing macroeconomic phenomena (Smithin, 2003). Unfortunately, in the last decades macroeconomists and political economists alike have largely disregarded these relevant research questions about the institutional evolution of, and inherent need for, central banks within resilient banking systems (Smith, 1990 [1936]; Smithin, 2003, 2004). Thus, the relevant research question of whether central banks are necessary has largely been marginalized in the contemporary banking literature (Paniagua, 2019b; Schwartz, 1993; Selgin, 2017).

Respectively, pressing institutional research questions about central banks and their alleged inherent necessity and 'natural' evolution within banking systems have largely been ignored by macroeconomists. Indeed, as Vera Smith once noticed:

> In the present century centralised banking systems have come to be regarded as the usual concomitant, if not one of the conditions of the attainment of an advanced stage of economic development. The belief in the desirability of central bank organisation is universal. . . . There is, however, a noticeable lack of any systematic examination of the bases of the alleged superiority of centralised banking over its alternative. . . . Very little attention has been paid in modern economic literature to the consideration of the rationale of the particular system of banking that we have succeeded in evolving, in the light of the progress that has been made in economic science. (Vera Smith, 1990 [1936], 3–4)

Echoing Vera Smith, and in order to address this neglected research question about central banks, part II utilizes Goodhart's (1988) *The Evolution of Central Banks* as a theoretical motivation and starting point to start addressing this research question about the apparent need for certain monetary institutions and their 'natural' institutional evolution. Specifically, part II attempts to shed light upon this institutional research question by examining both the theoretical arguments and the historical evidence that are generally employed in the banking literature in order to sustain the general case for the 'natural emergence' of, and inherent need for, central banks.

Consequently, part II of this work starts in chapter 3 by exploring the theoretical arguments and the historical evidence used to sustain the case for the 'natural emergence' of central banks as intrinsic and monocentric-only solutions to crucial banking challenges. By borrowing from Goodhart's (1988) *The Evolution of Central Banks*, chapter 3 critically examines Goodhart's theoretical claims that central banks must evolve naturally as the only institutional responses and solutions to collective banking challenges. Chapter 3 critically examines the institutional rationale behind the 'natural' evolution of central banks. Subsequently, chapter 3 and chapter 4 will also review some key historical evidence, arguing that Goodhart's historical generalizations about the 'natural' evolution of central banks are inconsistent with developments of the vast majority of the earlier proto–central banks in Europe. A particular focus will be on the historical and institutional evolution of the Bank of England, between the years 1694 and 1890, in chapter 4. Finally, throughout the critical examination of these theoretical arguments and historical evidence, part II as a whole ultimately attempts to answer the second research question concerning whether central banks evolve naturally and consequently whether central banks are inherently necessary.

The third and final research question addressed in this thesis relates also to monetary institutions and central banks, but particularly to diverse nonmonocentric monetary institutions and rules that could become institutional alternatives to central banks. In part II, attempts to provide answers to the second research question discussed above lead us also to recognize that central banks are not the only institutional possibility available for successfully governing collective banking affairs and for also providing crucial banking services (Paniagua, 2019b). Indeed, heterogeneous institutional forms of *nonmonocentric* banking orders could be able also to govern crucial banking problems and therefore able to 'naturally' evolve as alternative institutional solutions to banking challenges *without* necessarily relying upon central banks (Selgin, 1993, 1994; Goodspeed, 2016). It will be argued—throughout this dissertation—that institutional heterogeneity and nonmonocentric forms of banking are feasible institutional possibilities within resilient banking orders.

Hence attempts to elucidate the second research question ultimately lead me to suggest in this work that societies *do not* necessarily carry the burden of being institutionally 'ensnared' with central banks and that therefore they could potentially look for more robust and resilient monetary institutional alternatives (if there are any) to possibly transition toward (Salter, 2014b). This additionally indicates also that a comparative institutional analysis of monetary alternatives could potentially be a fruitful way forward for

macroeconomic research. This will be the focus of attention in the final part III.

The above insights concerning the lack of a serious institutional and theoretical justification for monocentric-only types of banking solutions to pressing monetary challenges suggest that theoretical examinations and the intellectual environment within macroeconomics could be ripe for further explorations in comparative institutional analysis (Smithin, 2004). More specifically, macroeconomics could be ripe for further exploring some novel and unattended research questions related to robust political economy, monetary-policy neutrality, and the comparative institutional properties of central banks and nonmonocentric alternatives (Salter, 2017a). Accordingly, the institutional findings of part I and part II concerning money and central banks reasonably lead to the third and final research question of this thesis: which monetary system is most robust under a comparative institutional analysis? Put differently, which monetary arrangement is most robust at 'managing' monetary policy and thus at overcoming both epistemic and incentive problems present inherently in it?

Aligning with this last research question, the focus of part III will move toward analyzing and comparing different monetary institutional alternatives under the framework of RPE and institutional analysis (Ostrom, 1990; Pennington, 2011, 2017; Salter, 2014b). Specifically, in order to address this third and last research question, part III will first develop and later apply a framework for monetary institutional analysis and political-economic robustness considerations to assess and compare the institutional robustness (and efficacy) of central banks and alternatives such as NGDP targeting and free banking.

Consequently, part III starts in chapter 5 by proposing a novel RPE framework for engaging in banking and comparative institutional analysis within monetary policy. Thereafter, chapter 5 and chapter 6 propose a novel *non-ideal* analytical framework for bridging institutional analysis, RPE, and monetary theory, in order to realistically (non-ideally) compare and assess different monetary institutions and policy rules. Subsequently, both chapters provide applied exercises in comparative institutional analysis between central banking and diverse nonmonocentric banking alternatives. Finally, throughout this application of this novel non-ideal banking RPE framework, part III ultimately attempts to answer the third and last research question of this dissertation: which monetary arrangement is most robust at conducting monetary policy?

Three Overlapping Themes to Address Some Neglected Research Questions

Now that I have reviewed and made explicit the series of research questions that motivate this work and that will be addressed throughout this thesis, I will now explain and outline in more detail the three major themes that will enable me to address the aforementioned research questions. This will be followed by a brief explanation concerning the broad aims and scope of this work. The three major themes related to the research questions of this thesis are the following: First, part I seeks to understand how the macroeconomy—based upon the non-Walrasian use of money—really possesses important properties that resemble an organized complex system, and it examines the implications of those inexorable properties for the correct study of the macroeconomy. Second, this work explores the crucial role and functions of money in generating a complex economic system, and it explores money's social role in generating an orderly system of exchanges that produces emergent and epistemic social properties not present or nonexistent previously (ex ante). Third and finally, this work deals with the functions and workings of different banking and monetary institutions and how their different epistemic and incentive properties affect money's production and exchange.

Hence this thesis deals with the epistemic and socio-relational functions of money, in generating an organized complex system, and its surrounding banking institutions, emphasizing the role that both play in the promotion (or erosion) of an organized and complex macroeconomic order. This work therefore offers a much broader and wide-ranging perspective upon money and banking institutions than can be usually found in the traditional and formalist macroeconomic and banking literature.

Since this work deals largely with the use of money in society and its implications for organized complexity, this thesis logically proceeds by dealing first with some general and highly abstract features of the macroeconomic order as an organized complex system and with its implications (and challenges) for the most suitable economic methods to best understand it. This is followed by a more concrete analysis of the epistemic role of money in society, ultimately culminating with a more applied and specific institutional analysis of the banking institutions that guide and affect money's production. In simple terms, the logical flow of the main arguments of this work goes from understanding macroeconomics as a complex order, to examining the unique role of money in generating and sustaining such a complex economic order, and finally to focusing more practically upon comparing alternative banking institutions that affect money's circulation within such an order.

As the title of this work suggests, money is obviously the main theme and the theoretical focus of this entire work; however, as hinted earlier money is intimately related also to—and perhaps even *indivisible* from—both an emergent complex macroeconomic order and the banking institutions that affect its production (Horwitz, 2000; Lewis and Wagner, 2017; Smithin, 2000). Consequently, the focus of this work will gradually tend to gravitate toward the relevant banking institutions that affect (and guide) money's production and consequently that broadly determine the emergent complex macroeconomic order (Smithin, 2004). Throughout this aforementioned and logical sequence of themes, it will become easier to address, in a coherent and consistent manner, the aforementioned research questions that motivate this work.

As hinted above, a large portion of this work—particularly parts II and III—therefore engages in comparative and institutional analysis and goes beyond monetary theory narrowly conceived. Hence it incorporates insights from constitutional political economy, socio-economics, complexity theory, banking history, and epistemology. The broad aim of this work is to suggest an alternative research road map and a vision for a plausible institutional and constitutional research agenda for macroeconomics. Such an institutional research agenda for macro will provide a better understanding of the emergence of macroeconomic phenomena, such as economic crises, always conditioned by the political-economic and institutional fragility (or robustness) of different monetary systems or monetary rules. In so doing, and by borrowing also from E. Ostrom's (1990; 2010) institutional approach, this thesis will often highlight and scrutinize the importance of two sets of institutional properties, both of them largely neglected by macroeconomists. Specifically, this work focuses on comparing and scrutinizing both the incentive and knowledge (epistemic) properties present in any given monetary institution and how they subsequently affect the actions undertaken by monetary policy makers (see also Salter, 2014b, 2017).

More specifically, parts II and III will stress also the relevance of both incentive problems (misalignment of incentives, regulatory capture, and political pressure) and cognitive constraints (epistemic challenges and informational limitations) present in the fields of monetary policy and banking stability. Thus it seeks to explore the institutional implications for monetary policy and the macroeconomy at large whenever the real institutions of banking, and the non-ideal agents that are making decisions within them, deviate strongly from the standard neoclassical assumptions about aligned incentives and complete benevolence, and also from neoclassical assumptions about robust cognitive rationality and availability of information (a large degree of omniscience or complete information of the situation). In this important sense, a large portion of this work will attempt to bridge ideas from non-ideal theory in political economy with monetary theory and institutional analysis, in order to explore how monetary policy and banking stability will likely function and operate under *non-ideal* monetary institutions and *boundedly rational* human agents.

Why Money?

There is perhaps no other economic good or system of social relations that is so important for our social orders and prosperity, yet so neglected and misunderstood, as money (Horwitz, 1992a). Political economists, at least since Adam Smith and David Hume, have long acknowledged the numerous benefits

of a monetary economy; however, much research remains to be done concerning the crucial epistemic and relational roles of money and the most propitious and robust institutional arrangements for its supply. One fundamental yet largely unexplored question relates to the relative roles that banking institutions, social relations, and knowledge play in determining and maintaining (or potentially undermining) a complex monetary order. Modern macroeconomics has largely analyzed money and the macroeconomy at large through mathematical models of atomistic, utility-maximizing, and representative agents, paying little attention (if any) to exchanges and to the socio-interactive and institutional context within which such representative agents act and utilize money (Kirman, 1992).

Paradoxically, modern macroeconomics—through the use of generalized mathematical abstractions and dynamic stochastic general equilibrium (DSGE) models—has largely neglected two fundamental details about economic reality: first, the fact that the macroeconomic order comprises a myriad of heterogeneous individuals interacting through the use of money; and second, the fact that those agents are also unable to produce the medium of exchange by themselves, and thus rely upon larger financial and banking institutions that provide their medium of social relations (Ingham, 2000). Hence there seems to be a fundamental and complex relationship between heterogeneous agents, decentralized and fragmented monetary social relations, and monetary institutions that seems to be at the core of any organized and beneficial macroeconomic system (Paniagua, 2018a). It is actually such a complex relationship—as will be argued in part I—that generates and sustains the entire macroeconomic emergent order. However, these fundamental features of the macroeconomy (money, social relations, emergence, and institutions) are currently being ignored by the mainstream economic literature.

In other words, the contemporary and mathematical DSGE models with a single representative agent are not helpful in illuminating exactly what constitutes the foundations and basis of a complex monetary order. Both social and banking institutions and the manners in which heterogeneous and decentralized individuals cooperate and interact via the use of money *within* particular rules have been seriously neglected by current macroeconomic approaches. Puzzlingly, the contemporary mathematical literature on macroeconomics, money, and banking is not truly relevant to the emergent macroeconomic order and for explaining also the *institutionally contingent* formation of economic crises (Howitt, 2012; Kirman, 2010). This explains also why most macroeconomists have been largely puzzled about the underlying origins and institutional causes of the Great Recession (Buchanan, 2010; Sumner, 2012). This work will seek to contribute to filling those research gaps by (a) addressing the aforementioned three relevant, yet neglected, research questions concerning money, organized complexity, and banking institutions and (b) by extending those aforementioned monetary and banking institutional themes into new areas of research on the intersections between monetary theory, non-ideal political economy, and institutional analysis.

The major motivations of this work concern the subjects of money and monetary institutions and their recently neglected role in generating economic crisis and in affecting the macroeconomy (Buchanan, 2010; Kirman, 2010). I believe that money, as will be shown throughout part I, is the most central, relevant, and paradoxically dangerous medium of social relations of any human socio-economic order (see also Marx, 1973 [1939] and Yeager, 1968). Almost every single exchange, market interaction, or cooperative and contractual agreement made in organized (and also informal) markets takes place through the use of money (Clower, 1984a, 1984b). Money is therefore ubiquitous in all of our socio-economic interactions and also in our ways of thinking (Horwitz, 2000; Mitchell, 1937; Yeager, 1968).

Money and money prices, like the language we speak, literally permeate almost *all* of our social affairs, and thus they affect the way we think and act (Hodgson, 1994; Horwitz, 1992a). Thus, it is not quite an exaggeration to say that money 'touches' (intermediates), at least indirectly, almost everything we do in commercial societies (Clower, 1984a). Hence it is not a surprise that Mitchell (1937), in his study of money as a crucial socio-economic institution, stressed the relevance it has in shaping human mentality, human cognition, and human nature: 'The money economy . . . is in fact one of the most potent institutions in our whole culture. In sober truth it stamps its pattern upon wayward human nature, makes

us all react in standard ways to the standard stimuli it offers, and affects our very ideals of what is good, beautiful and true' (Mitchell, 1937, 371).

As Mitchell argued, the emergence and the use of money in society cannot be reduced to, nor explained simply by, the mere fact that it reduces transaction costs and makes trade easier for merchants (Mitchell, 1937). We need to acknowledge also that 'the penetration of money exchange into social life altered the very configuration of rationality, stimulating the peculiarly modern conceptions of abstraction, measurement, quantification and calculative intent' (Hodgson, 1994, 587; see also Mises, 1981 [1922]). Not for nothing also Marx described money as 'the God among commodities' (Marx, 1973 [1939], 221). Hence for these social and epistemic reasons alone, money should be considered, at least prima facie, a crucial matter of study within macroeconomics in particular and in the social sciences in general. I hope that this work can persuade the reader of the unique relevance of money and its surrounding institutions in largely determining and shaping emergent macroeconomic reality and social rationality.

Yet the reader may still legitimately ask, Why should we be so concerned about money, among the many other economic goods and social interactions present in the modern economy? The answer to this question—as will be shown in chapters 1 and 2—resides in the fact that money is central in generating an orderly system of social relations that provides the core properties for sustaining an organized complex system that we call the macroeconomic order and economic coordination. Money, as will be argued in chapter 2, is therefore fundamental and unique for the generation and emergence of novel complex economic and epistemological phenomena that sustain the entire socio-economic order and the beneficial coordination of individuals and production in modern commercial societies (Paniagua, 2018a; Simmel. 1978 [1907]).

Indeed, most of our cooperative endeavors, exchanges, and daily work interactions are performed through the medium of exchange (money). Hence, as Clower succinctly put it, 'Goods buy money, money buys goods—but goods do not buy goods in any organized market' (Clower, 1984b, 100). Thus, it is not a stretch to argue that money 'touches' or intermediates (almost) everything we do in the economy and in our cooperation processes. Paradoxically, it is also money's pervasiveness and ubiquity in our daily interactions that generates both the benefits and also the potential dangers of using only money in coordinating our exchanges (Yeager, 1968). Consequently, as Mill (1929 [1848], 488) argued, if money is 'out of order', potentially all of our social relations and cooperative endeavors could also potentially be 'out of order'. Money therefore could become a kind of 'double-edged sword' system of social relations if nonrobust or fragile monetary institutions poorly manage it and supply it.

Money's pervasiveness in our social relations, rationality, interactions, and coordinative and cooperative capacities is almost as deep, wide, and ingrained as the use of language itself (Dodd, 1994; Ingham, 1996a). Hence it can hardly be treated simply as a 'veil' over barter relations or as just another (liquid) good among the many present in our economy (Clower, 1984a, 1984b; Dyer, 1989; Ganssman, 1988). In addition, it has been argued by many economists from Mill, to Keynes, to Friedman that money and its institutions are particularly relevant in generating business fluctuations and economic crises (Friedman, 1975; Keynes, 1930). Indeed, many economists, such as Mill, Thornton, Marx, Friedman, and others—all from very different methodological perspectives—have convincingly argued that money and its surrounding institutions have played fundamental roles in the manifestation of economic crises that have plagued capitalistic economies (Laidler, 2004). Yet modern macroeconomic theory, based on highly abstract, formalist, and reductionist models, seems to be moving ever further away from recognizing these fundamental facts and insights about money and complexity known to political economists and sociologists for centuries (Horwitz, 1992a; Ingham, 1996a, 1996b; Laidler, 2004, 2011).

Alas, the idea that money and monetary institutions matter has been forgotten in modern macroeconomic research over the last thirty years (at the very least), and this in part explains also the revival of the age-old *institutionless* debate about the inherent instability of the decentralized market economy based on

private property and monetary exchanges (Howitt, 2012; Laidler, 2004, 2011; Minsky, 1986; Smithin, 2004). The idea that both money and monetary institutions are fundamental in generating complex economic orders and also in potentially generating economic crises has been paradoxically neglected by macroeconomics today in providing explanations of the Great Recession. This in part explains also why public intellectuals have come back to superficially argue about the inherent instabilities of capitalism, without further exploring also the specific institutions through which commercial societies are indeed sustained. Arguing that capitalism is inherently unstable doesn't add much to the more productive and practical debate concerning which are the underlying institutions that could make capitalism more robust and able also to avoid generating severe economic crises.

Indeed, this theoretical neglect of money and its institutions has been one of the most severe intellectual gaps in economics over the last fifty years (Calvo, 2013; Horwitz, 2000; Laidler, 2004). It is thus the major fact that has motivated me to write this work. This dissertation then is an attempt to argue that money, and its institutions, matter a great deal in determining either the beneficial or detrimental emergence of macroeconomic outcomes, and it argues that modern macroeconomic models—represented by the new neoclassical synthesis and its DSGE models—are not particularly helpful in illuminating what are the key aspects of a monetary order that deals seriously with complex and emergent phenomena (Kirman, 1992, 2010; Smithin, 2004).

It has long been acknowledged, since Frank Hahn's (1965) remarks at least, that the fundamental problem with the modern Walrasian-equilibrium framework for macroeconomic modeling is that, given its assumptions, it leaves no room for either dynamic exchanges performed in disequilibrium (or false, non-market-clearing) prices or the use of money as a mechanism to establish those exchange relations (Howitt, 2012). In other words, it leaves no analytical room for economic phenomena that arise from analyzing monetary exchanges in an imperfect dynamic setting (Laidler, 2011). From this it follows logically that this Walrasian 'macro approach' is unable to illuminate macroeconomic fluctuations and financial crises—as emergent phenomena—and their deep relationships to money and its surrounding institutions (Buchanan, 2010; Lucas, 2004).

However, despite these recognitions and limitations, macroeconomic research is still engaging in 'business as usual' within the Walrasian paradigm and macroeconomic models based on the postulate of rapidly adjusting and clearing markets and representative agents (Kirman, 1992). These last thirty years of modern macroeconomic research can be characterized by neglect of the obvious fact that what we call market economies are actually monetary networks and *institutionally embedded* economies that *do not* function 'as if' overseen by an omniscient and benevolent auctioneer (Hodgson, 2000a; Lucas, 2004; Laidler, 2004). Alas, if we are indeed going to attempt to ameliorate the problems related to economic crises and business cycles, we need to better understand the unique role that money plays in generating—or potentially undermining—the emergent complex order of the macroeconomy. If we keep disregarding money and its institutions in our contemporary assumptions, models, and methods of research, we will be unable to improve our fragile macroeconomic state of affairs. I hope that this work will contribute to bringing back the analytical and theoretical relevance of acknowledging money, complexity, and monetary institutions in macroeconomic and banking research to eventually (and hopefully) improve our current monetary institutions and the whole macroeconomic order.

If money and its surrounding institutions can be better understood, perhaps institutional reforms concerning money and banking could be implemented to mitigate severe economic recessions. For these reasons, further research on money, complexity, and monetary institutions should be encouraged. In other words, as Mill (1929 [1848]) suggested, if an orderly and well-functioning monetary order is the foundation for an advanced, cooperative, and wealth-enhancing economy (see also Friedman, 1994), then we must examine seriously the underlying banking institutions and their properties that constitute the basis of such a well-functioning and resilient monetary order.

Given the above, and in response to the 2008–9 Great Recession, I argue throughout this work that it is necessary to return to and to revive the broader tradition of monetary analysis based on the monetary-equilibrium framework, and political economy as developed before the rise of the Arrow-Debreu general-equilibrium framework in the 1970s (Warburton, 1981; Yeager, 1986). This requires once again acknowledging the fundamental—and perhaps obvious—facts that, first, the macroeconomy is actually a complex and dynamic ecosystem of voluntary market exchanges performed indirectly and mediated *always* by money and disequilibrium money prices; and, second, money, as a crucial mechanism of socio-economic interactions, is actually never produced by the interacting agents of the system, but rather only by certain specific monetary institutions or 'legally granted' banking institutions that possess particular incentive mechanisms and informational properties that deeply affect its supply (Ingham, 1996a; Smithin, 2000, 2003). Exploring the theoretical and institutional implications of these perhaps-obvious facts will be the major task undertaken in this work.

Ultimately, it is only through the use of money that individuals seek to collaborate and coordinate their decentralized activities in markets with other individuals that perhaps they don't even know and perhaps will never even see (Clower, 1984a, 1984b; Hayek, 1973). It is only through the use of money and money prices that individuals in commercial societies can attempt to overcome or bypass what Keynes (1930, 1936) denominated 'the dark forces of time and ignorance' (see also Hayek, 1967 [1935]). Consequently, monetary institutions—which deeply affect money's production—can severely exacerbate or dissipate those 'dark forces' that impede and hinder human cooperation and economic development. This work argues that the only manner in which we can overcome, or at least ameliorate, those 'dark forces of time and ignorance' and the emergence of economic crises is through a careful study and comparison of the degrees of political-economic robustness that different monetary institutions possess. In other words, this dissertation argues that macroeconomics has to become less formalistic and abstract and more political-economic and institutional in its orientation.

Put somewhat metaphorically, Adam Smith's allegory about the 'invisible hand' that unintendedly coordinates the market economy has actually very visible *monetary fingers* and also a *monetary-institutional brain* that moves those fingers. Insofar as the monetary and banking 'brain' and its 'fingers' fail to function properly, so does the entire market economy and the invisible hand that is supposed to coordinate markets (Laidler, 2011). Instead, if the visible 'monetary fingers' are working properly, then exchanges are not being hampered or distorted, and consequently the 'invisible hand' coordinative property of the market economy can arise as an emergent feature of such an orderly system of exchanges. In other words, the 'monetary fingers' and the 'monetary-institutional brain' of the entire economy seem to be the causal elements that generate the 'invisible hand' coordinative function of the market economy, as a novel, emergent, and irreducible property of the orderly use of money in society (Lewis, 2015; Paniagua, 2018c).

This Smithian metaphor of the 'invisible hand' and the visible 'monetary fingers' might also help us to shed light on the Mill quote that opens this preface. Insofar as the 'monetary fingers' of the invisible hand move smoothly, Mill argues, the economy will move and coordinate *as if* led unintendedly by an invisible hand. When that occurs, Mill suggests, we barely notice the ubiquitous presence of money in the coordination process of markets, and consequently the invisible hand is as invisible as possible (Mill, 1929 [1848]; see also Laidler, 2004, 2011). However, the 'monetary fingers' of the market economy become very visible, and money 'exerts a distinct and independent influence of its own when it gets out of order'. When that occurs instead, the 'invisible hand' (as an emergent property of the market) ceases to function smoothly, and the malfunction of the 'monetary fingers' suddenly becomes very visible throughout the real economy and exchanges. Consequently, the visible malfunctioning of those 'monetary fingers' will impede the 'invisible hand' from coordinating exchanges and economic plans accordingly, harming the entire economy. It is the recognition of this Smithian allegory that should make us wary of contemporary macroeconomic models that disregard both money (the fingers) and its institutions (the brain) as relevant causal and generating macroeconomic elements.

New Directions in Complexity, Knowledge, and Monetary Institutions

As suggested throughout this preface and by the title of this work, this thesis is largely an exercise in comparative monetary systems and monetary institutional analysis. However, before engaging in specific institutional analyses and comparisons of monetary alternatives, I outline the crucial epistemic and complexity-based reasons why money matters in the coordination of economic activities and in generating macroeconomic phenomena of interest. If money were unimportant in an economic order or merely a secondary 'veil' over the underlying economic system, then it would be unnecessary to explore banking institutional alternatives of how money could be indeed supplied. After all, if money did not matter—for creating or coordinating an orderly economic system or for affecting the emergence of economic crises—then perhaps it would be more effective to allocate intellectual efforts to other aspects of the market order to improve our well-being. But if a comparative institutional analysis of monetary rules and alternatives is deemed a necessary intellectual exercise for promoting sound reforms to our fragile macroeconomic state of affairs (Buchanan, 2010; Salter, 2014b), so that future economic crises can be lessened, then it is necessary to first provide plausible arguments to understand why money is unique in the economic order and why it is worthy of further analysis and institutional considerations.

In other words, if we consider applied monetary institutional analysis and monetary institutional comparisons a very important—yet severely neglected—intellectual and research endeavor in macroeconomics, as has been suggested throughout this preface, then we must first provide convincing arguments as to why both money and its surrounding banking institutions really matter in the formation and emergence of complex macroeconomic orders and epistemic systems in the first place. Consequently, this thesis starts first by providing those theoretical and more abstract arguments about the crucial complexity-based and epistemic relevance of money in society and its unique social role in the formation of an orderly system of social relations that produces novel macroeconomic and epistemic complexity, rather than starting directly with a focus on its specific and surrounding banking institutions and their applied comparative analysis.

Before this institutional and emergentist transition in macroeconomic research is possible, I must first provide convincing arguments as to why the unique medium of socio-economic relations—which those very same monetary institutions produce—should be worthy of further scrutiny. This thesis therefore aims to explore, in a logical sequence (from the most abstract and theoretical to the more concrete and applied aspects), three distinct yet highly interrelated and complementary macroeconomic topics that are closely related also with addressing the aforementioned three relevant research questions.

These interrelated themes are (a) the role of money, knowledge, and organized complexity in generating the macroeconomic order, (b) the institutional evolution of central banks, and (c) a comparative institutional analysis of different monetary alternatives. Each of these three broad macroeconomic and monetary topics will be explored in depth in the three sections of this work, part I, part II, and part III, each comprising two chapters. As clarified at the beginning of this preface, the objective is to develop these three interrelated monetary and banking themes in order to address some relevant and severely neglected research questions in macroeconomics concerning (a) why money matters in determining complex macroeconomic phenomena; (b) whether central banks evolve naturally and, consequently, whether central banks are inherently necessary; and finally (c) which monetary arrangement is most robust at conducting monetary policy. Given this series of research questions, the objective is to develop the three research themes outlined here, in order to acquire alternative comparative methods and an alternative analytical framework of monetary analysis that will actually enable me to address the three research questions, rather than assuming them away as it would be the case using formal methods.

Given the above series of research questions that motivate this work, part I first examines the analytical and methodological relationship between organized complexity and macroeconomic inquiry, the epistemic role of money as an orderly system of social relations, and money's role in generating economic

complexity. Parts II and III explore jointly the institutional details and the *institutional implications* of the use of money in society and the need for monetary constitutions (and rules) that such a coordinative, but contingent, role of money entails. These last two parts suggest a novel institutional and complexity-based research agenda in macroeconomics, for identifying alternative, but robust, institutions juxtaposed with the institutionally fragile rationale for and politically entangled evolution of central banks.

Consequently, concerns regarding the role of money and complexity explored in part I, combined with the analysis of the evolution of central banks and the lack of an institutional rationale for them in banking systems, as explored throughout part II, show the need for comparative institutional analysis in monetary theory. Such a task is finally undertaken in part III, which scrutinizes nonmonocentric monetary alternatives that might be robust for 'managing' money and overcoming both knowledge and incentive problems present in monetary policy (see also Paniagua, 2019b). The following paragraphs contain a detailed synopsis of the major themes explored in each general part, in order to address and provide some answers to the relevant, yet neglected, three above-mentioned research questions.

Specifically, part I of this thesis, which comprises chapters 1 and 2, explores the theoretical and more abstract topics of this work, broadly concerned with the ideas of organized complexity and its methodological implications for macroeconomic theory, money, knowledge, and coordination. Part I provides the starting point and foundational arguments for why, theoretically, money and its surrounding institutions are *indivisible* from, and a critical subject matter in, macroeconomics. Building on recent literature on complexity theory and social ontology, it elaborates on the unique epistemological and complexity-based role of money and money prices in the economy, arguing that money is unlike any other commodity, good, or even other medium of social relations such as language. Exploring the themes of complexity, epistemology, and social ontology related to money will help to provide answers to why money matters in determining macroeconomic phenomena.

By using arguments from complexity theory, constitutional political economy, social ontology, and epistemology, I contend here that money is *the* most important element in generating both an orderly system of economic relations and also potentially beneficial economic complexity. As an emergent property from those *monetary relations*, this interactive system of money-based exchanges creates the irreducible and emergent economic knowledge that further sustains the process of wealth-enhancing coordination in markets (Paniagua, 2018a). In other words, the primary focus of part I is to outline theoretical arguments demonstrating that the macroeconomy is inherently complex (it possesses the core features of an organized complex system) and thus that it is largely an *institutionally conditioned* emergent property of organized monetary systems of relations. This provides strong analytical and methodological reasons why it is necessary to shift our intellectual efforts and methods of analysis away from narrow formalisms and reductionisms in macroeconomics and toward monetary institutions, comparative institutional analysis, and money in order to better analyze the monetary 'eco-structure' (monetary constitutions and institutions) and the system of banking rules under which beneficial economic complexity and coordination can indeed emerge (Lewis and Wagner, 2017).

Carrying forward the insights from part I, part II of this thesis, which comprises chapters 3 and 4, investigates the less abstract topics of this work related to banking and monetary institutions. It focuses on monetary institutions, their history, and their evolution; more specifically, it focuses on the institutional and economic rationale behind the need for, existence of, and potentially 'natural' institutional evolution of central banks. If we care about studying money and the macroeconomy at large, then the study of central banks is a crucial theoretical and practical aspect of institutional analysis in macroeconomics. If we theoretically should care about monetary institutions, as chapter 1 suggests, then it is necessary to explore the theories and arguments behind the development of central banks in order to understand their institutional evolution and their potential inherent inevitability within banking systems (Goodhart, 2010; Smithin, 2004).

In a nutshell, the second topic of this work moves away from the role of money and complexity in the abstract, as explored in part I, and first explores the more concrete theoretical arguments that claim that central banks are the only institutionally rational response to severe banking challenges, and are indeed a necessary and only response to them. And second, I explore historical claims and scrutinize evidence that suggest that central banks are the natural and inherent institutional evolution of resilient banking orders. These institutional and historical arguments related to the 'natural' evolution of central banks, explored throughout part II, will help to provide answers to the second set of research questions: Do central banks evolve naturally? And are central banks inherently necessary?

As argued earlier, the broader scope of this work is to provide an intellectual framework for engaging in institutional analysis of monetary and banking alternatives so that we can compare different institutions and judge them according to some monetary and political economic criterion. However, there seem to be strong theoretical and historical institutional and economic arguments in favor of—and showing the inherent need, as pertains to banking stability, for—central banks, which might suggest that a comparative institutional analysis is an unnecessary intellectual endeavor in monetary theory (Goodhart, 1988). Therefore, prior to arguing for the need for institutional comparisons and looking for more radical, and perhaps more resilient, alternative monetary systems, I must first scrutinize the aforementioned institutional and historical arguments in favor of central banks in depth before moving forward. This is the core focus of, and underlying justification for, part II.

The third and final part of this work comprises chapters 5 and 6 and explores the last institutional and applied topic in the thesis. This final part elaborates further the institutionally oriented themes about money, central banks, and the money supply, explored in the previous section, by extending them to other, nonmonocentric monetary institutions and comparing them. Given that central banks are not the only, necessary, and inherently natural institutional evolutionary outcome of banking systems—as contended in part II—part III expands upon the previous analysis of central banking, to engage in comparative analysis of more radical alternatives (see also Paniagua, 2019b). Thus part III explores further the institutional properties of central banks briefly delineated in part II and also the idea of comparative monetary analyses, but applied here in particular to the realm of monetary policy and the production of money.

Providing answers to the research questions posited in part II concerning the apparently 'natural' evolution of, and the institutional and theoretical justifications for, central banking suggests that the intellectual field of inquiry and research in macro is wide open for further explorations in comparative institutional analysis between central banks and other, more radical alternatives (Paniagua, 2017). Moreover, addressing the second set of research questions suggests that the exploration of more radical and decentralized institutional and monetary alternatives is actually warranted in macroeconomics if we desire to promote sound reforms to our fragile banking systems. Hence, the general scope in part III logically transitions to applying institutional analysis and political-economic robustness considerations and a comparative monetary institutional analysis—which were briefly delineated also in chapter 4—to the realm of monetary policy and the money supply. Thus part III aims to provide a novel analytical and political-economic-oriented framework for monetary institutional analysis, and provides also an applied exercise in comparative institutional analysis of different monetary and banking alternatives.

In attempting to answer the final research question, part III ultimately offers two major contributions. First, it delineates a novel RPE framework for comparative and monetary institutional analysis (Paniagua, 2016b; see also footnote 1). This novel RPE framework is compatible with and applicable to potentially *all* monetary policy rules and institutional analysis in banking (Salter, 2017a). Particularly, it is here used to assess and compare the relative political-economic and institutional robustness of different monetary policy rules and institutional alternatives such as nominal gross domestic product (NGDP) targeting, central banking, and free banking. Second, it provides also a subsequent application of the proposed comparative RPE framework of analysis. I do this to illuminate, under non-ideal conditions, an

institutional and RPE analysis comparing central banking and nonmonocentric alternatives in their ability to maintain monetary policy that is consistent with monetary equilibrium and monetary stability (Paniagua, 2016a). The objective is to compare, under non-ideal conditions, both NGDP targeting and free banking against central banking in order to address the final research question: which monetary arrangement is most robust at conducting monetary policy?

To summarize, the logical sequence and the argumentative flow of the major themes explored throughout this thesis run as follows: I first argue in part I that money and its surrounding institutions matter in unique ways in generating novel macroeconomic complexity and social knowledge. Thus the crux of the matter in *emergent* macroeconomics, which takes complexity and emergence seriously, is ultimately non-ideal monetary institutional analysis (Smithin, 2004). Subsequently, in part II, I argue that central banks are *not* inherent and institutionally natural evolutionary outcomes of banking systems; nor are they necessary institutions for a sound and resilient banking order. This consequently opens the field of macroeconomic inquiry to more radical and polycentric alternatives (see also Paniagua, 2017, 2019b). Only then, in part III, after presenting the (rather replaceable) *non-inherent* and potentially fragile role of central banks as monetary institutions in generating economic complexity, can this work more confidently engage in a comparative institutional analysis of different and more radical alternatives. The thesis thus concludes in chapter 6 with some observations regarding the relative institutional robustness of free banking over central banking and the long-term possibilities for institutional and polycentric reforms within existent banking systems.

Toward a Novel Political Economy and Institutional Research Agenda for Macroeconomics

The very title of this thesis—'Explorations in Political Economy of Money: Complexity, Knowledge, and Monetary Institutions'—suggests that this work borrows different ideas and insights from schools of thought in political economy, philosophy, economics, and political science. I engage in this broad intellectual study to explore relevant, yet neglected, aspects of the complexity-based role of money in society. Such explorations lead me to concentrate on how money relates to complexity, knowledge, and its institutions. The six chapters within this dissertation are intended to apply and combine the aforementioned ideas in order to delineate potential novel avenues of research for social scientists concerning money and its unique role in commercial societies. Thus this whole work aims at exploring how political economy can more broadly contribute to understanding the macroeconomy and how it is *indivisible* from money and its surrounding institutions. The final goal is to argue that macroeconomics is ultimately indivisible from explorations about money and its institutions and therefore methodologically and analytically indivisible also from political economy and institutional analysis.

Considering a potentially viable and fruitful future for macroeconomics, as hinted earlier in this preface, I argue that it is essential to focus on emergence, complexity theory, and monetary institutions and to understand the various types of *institutionally contingent* emergent macroeconomic phenomena that different banking institutions can actually generate under non-ideal conditions of human nature. Hence macroeconomics should move away from the current institutionless 'macroeconomics in a vacuum' type of research, as briefly presented in this preface, and embrace instead a different type of contextualized research that focuses on institutional analysis, conditioned emergent properties, and the comparative political-economic and institutional properties of different monetary frameworks and rules under non-ideal conditions of the human nature.

Hence throughout this work, I propose a novel political-economy and institutional research agenda of money and monetary institutions with broad brushstrokes from social ontology, political economy, complexity theory, and monetary theory. All six chapters address overlapping and complementary research questions and issues about money and its institutions. Together, as a single body of work, they can be interpreted as an attempt to propose and redefine, analytically and methodologically, what it means to practice non-ideal macroeconomics through an emergentist and 'complexity vision' (Colander and

Kupers, 2014; Smithin, 2004). Hence this thesis is a 'whole' intellectual application of the broad 'economic way of thinking' in monetary affairs.[3] Accordingly, it illuminates the series of research questions through economic reasoning and basic economic concepts concerning (a) the implications of how individuals relate through money, (b) how markets are formed (and determined) by the use of money, and ultimately, (c) how monetary institutions largely shape emergent macro phenomena based upon monetary interactions (Buchanan, 1964).

The major intellectual inspirations for the specific, yet rather eclectic, approach of this work mainly come from three broad lines of literature. The first comes from the intersections between the recent developments of the Bloomington school of institutional analysis (Ostrom, 1990, 2005, 2010) and the RPE framework for comparing and analyzing diverse polycentric systems and institutions (Boettke, 2012; Pennington, 2011). Together they provide a unique focus on the role of local knowledge, institutional craftsmanship, learning, and incentives and on how all these elements are severely shaped and affected by institutions and rules (Pennington, 2011, 2016; North, 1994).

The second literature considers the intersections between the revival of the 'alternative-monetary-systems literature' following the recession of 2008–9, particularly, the interest in both the theory of free banking, and the new, complementary interest in NGDP targeting (Beckworth, 2012b; Hetzel, 2009, 2012; Salter, 2014b). I combine this macroeconomic literature also with recent postrecession re-elaborations of some old monetarist and monetary-equilibrium theorists' insights; these are all represented in the forms of modern *market-based* macroeconomics and market monetarism, mainly advanced in the works of Horwitz (2000), Salter (2017), Sumner (2012), and Yeager (1968, 1986).

The third and final strand of literature comes from recent explorations in complexity theory, social ontology, the sociology of money, and emergent phenomena and from the methodological challenges they pose to and analytical implications they have for both institutional analysis and macroeconomic research (Hodgson, 2000b; Ingham, 2000; Lawson, 2016; Lewis, 2015).

To sum up, the series of research questions and the different and eclectic streams of literature used throughout this work to address them can be coalesced analytically into contributing to the development of what Lewis and Wagner (2017, 1) have termed the 'New Austrian macro theory'.[4] In other words, it is a novel attempt to reconceptualize macroeconomics within a broader methodological and non-ideal conception, a banking institutional analysis, and a richer political-economic 'complexity vision' (Colander and Kupers, 2014; Smithin, 2004). Or in the words of Lewis and Wagner:

> By New Austrian macro we mean a style of theorizing that incorporates the core of traditional or Old Austrian macro and pushes the core in new directions by using new analytical tools and methods. . . . [it] is a product of blending some traditional Austrian insights and formulations with new analytical formulations that were never part of the Austrian tradition but which can multiply the analytical oomph of that tradition. (Lewis and Wagner, 2017, 1)

Consequently, the three broad intellectual sources of inspiration aforementioned are constantly relevant

[3] The 'economic way of thinking' is, as Buchanan (1964) and Boettke (2012) conceived of it, a political-economic and catallactic inquiry, meaning it focuses on exchanges (collaborative interactions), emergent properties, and the specific institutions or rules under which exchanges occur and emergent properties *contingently* appear. See also footnote 7 in page 26.

[4] Despite of the epithet given by Lewis and Wagner (2017), I do not consider this work in any way as blindly following or narrowly applying a particular school of thought or dogma in economics. Indeed, I entirely agree with Friedman when he commented that 'there is no Austrian economics—only good economics, and bad economics' (quoted in Dolan, 1976, 4). Within that dichotomy, there are certainly some 'Austrian' economists who have contributed to 'good economics'; nevertheless, the entire set of 'good economics' is not exhausted solely by them, nor does it belong only to them. While the present work borrows heavily from Hayek and his insights on complexity and the different epistemic properties of institutions, it also borrows widely from several other schools of thought, such as the Bloomington and monetarist schools.

throughout this work, although they play different leading and complementary roles at different times, according to the specific subject matter and theme of each chapter. Hence some streams of literature, ideas, and methods will appear in the forefront of the analysis at different parts, while some other ideas and methods will be in the background of the analysis in different chapters. Nevertheless, I hope that the reader can still get a unified, and hopefully stimulating and challenging, new vision of macroeconomics throughout this entire work.

Part I

The Monetary-Institutional Foundations of Complexity and Social Knowledge

'The existence of emergent properties can justify a distinctive sub-discipline of macroeconomics. . . . the possibility of emergence suggests there is a distinctive subject-matter for macroeconomics, centering on the tasks of identifying and illuminating the social relations, and associated systems of rules, that must be in place for social order . . . [to] be possible'.

Lewis and Wagner, 2017, 14

Chapter 1

The Challenges of Complexity in Macroeconomics: Toward a Political Economy of Money

> 'Too large a proportion of recent "mathematical" economics are mere concoctions, as imprecise as the initial assumptions they rest on, which allow the author to lose sight of the complexities and interdependencies of the real world in a maze of pretentious and unhelpful symbols'.
> J. M. Keynes, 1936, 272

This chapter provides a general overview of, and justifications for, the methodological strategies and frameworks employed throughout the six chapters that compose this thesis. It uses the theory of complex phenomena and its unique properties to justify the employed alternative methodological strategies and nonformalist approaches. It also explores four crucial properties of complex phenomena and their relations with, and challenges to, modern macroeconomic models and their methodological criteria.[5] It acknowledges some crucial properties of complex phenomena and contrasts them with the methodological criteria and assumptions currently employed by modern macroeconomic models. Ultimately, the chapter provides arguments in favor of complementing current formalist approaches in macro with a nonformalist political-economic and institutional analysis of money, as provided throughout this thesis. Therefore, it provides a general intellectual justification for the methods and frameworks employed throughout this work.

I apply the properties of Weaver's (1948) notion of 'organized complexity' to the idea of the macroeconomy as a complex dynamic network comprising interacting agents who use money. This allows me to present theoretical and conceptual challenges and outline the methodological implications of complexity for macroeconomics. I do so in order to guide the intellectual endeavor and nonformalist methodological approaches in this work. Here I argue how using the notion of organized complexity—a 'complexity vision' in economics—and the properties of emergent phenomena can help us to reconceptualize the scope and vision of macroeconomics. The complexity vision here proposed is the one that guides philosophically and methodologically the whole intellectual endeavor of this work.

The proposed complexity vision serves as an alternative way of thinking about macro and seeks to reframe macroeconomics as the institutional and emergentist study both of money as a system of social relations and of the analysis and comparisons of different macroeconomic emergent properties conditioned to alternative monetary institutions. These unconventional research themes are all explored throughout the six chapters of this work. The dominant literature and current formalist methods in macroeconomics are unable to represent the macroeconomy as organized complexity and to represent its core causal properties (Axtell, 2014). Because of reductionist and debatable assumptions present throughout their methods, they inherently overlook causal features of complexity and reality.

[5] A general definition of a complex system is provided by Simon (1962, 267): 'Roughly by a complex system I mean one made up of a large number of parts that interact in a non-simple way. In such systems, the whole is more than the sum of the parts, not in an ultimate metaphysical sense, but in the important pragmatic sense that, given the properties of the parts and the laws of their interaction, it is not a trivial matter to infer the properties of the whole.' Hence 'the more interconnected parts to a system, the more likely it is that the system is best analyzed as a complex system' (Colander and Kupers, 2014, 46).

Thus this first chapter focuses on exploring which sorts of analytical frameworks and ways of thinking are most suitable to illuminate the macroeconomic reality and its complex properties as they actually seem to be, rather than concealing them. In addressing that question, we must recognize that the 'more dynamically and tightly interrelated the parts are, the more likely the complexity frame will be the more useful one' (Colander and Kupers, 2014, 14). Thus this chapter argues that if we take the 'complexity frame' seriously, we need to break away from the current methodological and conceptual straitjackets in macroeconomics. Simultaneously, we must look for alternative nonformalist ways of illuminating the macroeconomy as a complex system. I argue that this unfortunately involves, methodologically, moving away from current formalistic methods and their radical reductionism in favor of unconventional methods such as analytical narratives, historical analysis, and comparative institutional analysis.

Unlike what most formalist assumptions in economics propose, 'social systems are characterized by dense and diverse interconnections [that] have not been easily captured by standard science. . . . Many aspects of social systems are best viewed as inherently complex. . . . This small change in perspective has major implications in how we conduct social science' (Colander and Kupers, 2014, 49). This chapter seeks to explore those implications by taking the properties of organized complexity seriously.[6] As I argue, this complexity vision in macro inescapably leads to changing the focus toward institutional analysis and the potential use of nonformalist analytic narratives and historical analysis in monetary theory. Such an institutional and nonformalist change to macroeconomic research is ultimately a philosophical and methodological attempt to bring macroeconomics back to its 'main line' classical heritage and to the complexity vision and sensibilities of Adam Smith, John Stuart Mill, and other classical economists (Boettke, 2012; Colander and Kupers, 2014).

In this chapter, I provide arguments as to why a nonformalist institutional approach to money is a more suitable and sensible methodological approach for when we aspire to represent the macroeconomy as a complex system. The chapter also addresses three broad themes related to complexity theory and macroeconomics and their implications for and challenges to the methods and frameworks employed throughout this thesis. First, this chapter explores four crucial properties of complex phenomena and how they conceptually relate to the macroeconomic order. Second, the chapter evaluates the current narrow reductionist methodological and formalist criteria along with modern macroeconomics' underlying assumptions employed in models and how they conceptually conflict with the notion of complexity. I explore the radical reductionist way macroeconomics is being conducted and how these methods and assumptions are inherently incompatible with conceiving of the macroeconomy as a complex system. Third, based on these incompatibilities, I delineate an alternative political-economic approach to engage in a different, but complementary, form of macroeconomic research that embraces complexity while bypassing current conceptual and methodological straitjackets that conceal the properties of complexity and of economic reality.

Combining these three themes puts forth a novel nonformalist approach to macroeconomics that is sensitive to institutions (and rules) as well as organized complexity and its causal properties. Moreover, this chapter recognizes that such a complexity-driven political-economic approach to money and

[6] Weaver's (1948) distinction between 'problems of organized complexity' and 'problems of disorganized complexity' lies in the fact that organized complexity displays a type of order or regular pattern (structure of complexity) that arises from orderly interactions among the elements comprising the whole. A problem of 'disorganized complexity' instead is 'a problem in which the number of variables is very large, and one in which each of the many variables has a behaviour which is individually erratic [not purposeful], or perhaps totally unknown' (Weaver, 1948, 528). Contrarily, a problem of 'organized complexity' shows the essential features of an organization, meaning that the specific arrangement of the variables generates an order—an organizational property that possesses emergent features. Thus they are 'problems which involve dealing simultaneously with a *sizable number of factors which are interrelated into an organic whole*' (Weaver, 1948, 539, emphasis in original). Consequently, organized complexity must display a type of interconnectedness among the elements so that they are 'all interrelated in a complicated, but nevertheless not in helter-skelter, fashion' (Weaver, 1948, 539). Moreover, organized complexity 'depends not only on the properties of the individual elements of which they are composed, and the relative frequency with which they occur, but also on the manner in which the individual elements are connected with each other' (Hayek, 2014 [1975], 365). Hence systems of relations and connections are extremely relevant to generate complexity.

institutions is deeply rooted in classical economists' methods and thinking, or the 'main line' approach to economics taken by Adam Smith, David Hume, John Stuart Mill, and other classical economists (Colander and Kupers, 2014, 70–75). This is also understood in contemporary political-economic thinking as 'Smithian political economy' or as 'the economic way of thinking' (Boettke, 2012).[7] Hence the broad Smithian political-economic approach undertaken in this work distances itself methodologically both from conventional neoclassical theory and from the contemporary formalist methods that misrepresent both the macroeconomy and banking systems.

The chapter proceeds as follows: Section 1.1 explores Hayek's and Weaver's arguments about statistics' inherent limitations in dealing with complex phenomena. Their arguments are used as an illustrative foil to understand the general and underlying reasons why some formal methods fail to grasp the essential features of complexity. They also serve as a conceptual starting point for reconsidering the core properties that define complexity. Section 1.2 examines four crucial properties that define both organized complexity and the macroeconomic order. Section 1.3 reviews three methodological and conceptual criteria and assumptions currently employed in macroeconomics and how they are intrinsically and conceptually incompatible with the four reviewed properties of complexity. Section 1.4 proposes an alternative, Smithian framework of macroeconomic analysis that avoids current radical reductionism, methodological incompatibilities, and the shortcomings of formal models in illuminating complexity and the role of money. Section 1.5 concludes.

1.1 Interconnectedness, Emergence, and the Limitations of Statistics

In recognizing the complexity vision in economics, Hayek (2014 [1964], 264) argued that, as a method of analysis, statistics is analytically impotent when it comes to dealing with patterns of complexity within social events based on orderly systems of relations. To Hayek, and also to Weaver, statistics as a method is unsuitable to deal with social phenomena that display the essential features of organized complexity (see footnote 6 for a definition). Hayek argued that statistics is unable to illuminate the workings of complex 'more highly organized' phenomena. The conceptual inability of statistics to deal with complex phenomena is, as Hayek argued, because statistics, through its methods, deliberately ignores the relative positions of the elements within the whole; and further, it disregards the manner in which those elements are systematically connected. In Hayek's words:

> [Statistics] deals with the problem of large numbers essentially by eliminating complexity and deliberately treating the individual elements which it counts as if they were not systematically connected. It avoids the problem of complexity by substituting for the information on the individual elements information on the frequency with which their different properties occur in classes of such elements, and it deliberately disregards the fact that the relative position of the different elements in a structure may matter. . . . It proceeds on the assumption that information on the numerical frequencies of the different elements

[7] The 'economic way of thinking' is, as Buchanan (1964) and Boettke (2012), among others, conceived of it, logical and nonformalist economic inquiry. Building upon the classical economists, it focuses on exchanges (collaborative interactions), emergent properties, and the institutions in which exchanges occur and emergent properties *contingently* appear. It follows A. Smith's (1981 [1776]) vision to explore the nature and implications of contextualized exchanges upon society and the crucial influence of rules and institutions upon exchange and interactive relationships. Above all, for Smith, institutions and their comparative incentive and epistemic properties matter for explaining social outcomes and emergent economic reality. It is also an attempt to change economists' 'thought processes, to look at the same phenomena through "another window". . . I want them to concentrate on *exchange* rather than on *choice*. . . I should propose that we cease, forthwith, to talk about *economics*. . . . I should recommend that we take up a wholly different term such as *catallactics*, or *symbiotics*. . . . [meaning] the study of the association between dissimilar organisms . . . [and] that the association is mutually beneficial to all parties. This conveys . . . the idea that should be central to our discipline. It draws attention to a unique sort of relationship, which involves the cooperative association of individuals. . . . It concentrates on Adam Smith's "invisible hand," . . . the position that I advance is neutral with respect to ideological or normative content. I am simply proposing . . . that economists concentrate attention on the institutions, the relationships, among individuals as they participate in voluntarily organized activity' (Buchanan, 1964, 217–222).

> of a collective is enough to explain the phenomena and that no information is required on the manner in which the elements are related. The statistical method is . . . irrelevant to the solution of problems in which it is the relations between individual elements . . . which matters. (Hayek, 2014 [1964], 264–265)

This suggests that statistical analysis and other formalist approaches might have analytical and methodological limits preventing them from explaining and representing organized complex phenomena mainly because complexity arises exclusively out of institutionally contingent relationships between orderly and systematically connected parts (Hayek, 2014 [1964], 265). Statistics' methods, assumptions, and techniques of thought assume away generative properties of complexity that cannot be assumed away if we want to preserve the notion of organized complexity and comprehend social structures that are clearly not reducible to the mere sum of their component parts or their properties (Colander and Kupers, 2014).

In other words, there might be certain methods and frameworks of analysis—such as statistics, as Hayek identified—that by their mere procedures and forms of thinking negate the existence of crucial properties that generate organized complexity. Hence if social systems and organizational structures are systems that display features of an organized complexity and thus are systems that are best analyzed as complex ones (ibid., 44–49), then using certain narrow methods that exclude or negate the existence of core properties that explain complex phenomena might be after all not only a misapplication of methods, but also a severe waste of intellectual resources that could undermine social scientists' efforts to understand such phenomena.

Statistics thus proceeds under the reductionist assumption that the numerical information about the isolated parts, the randomly distributed numerical frequencies of their properties, and the repetition of the classes of behavior of the different elements are sufficient to explain organized complex phenomena. As Hayek (1952a, chapter 6) identified, statistics replaces and transforms the original underlying information about the attributes and positions of specific individuals and their systematic relationships into numeric 'information on the frequency with which their different properties occur in [unrelated] classes of such elements' (Hayek, 2014 [1964], 264; see also Ostrom, 1982).

This way of treating the 'social data' shifts the analytical focus away from positions and relations and toward the frequencies at which the properties of parts appear as separate entities or unrelated classes. Thus it conceptually alters the underlying information about social relations and the attributes of specific agents into statistical aggregates that convey instead how frequently the separate attributes (devoid of context) appear in the whole. These aggregations of attributes and classes are actually concerned not with particular individuals' attributes and their relations with others in context, but rather 'with attributes of which we know only that they are possessed by a certain quantitatively determined proportion of all the individuals' (Hayek, 1952a, 124; see also Ostrom, 1982).

Thus statistical wholes are entirely different in nature and in composition from the complex wholes we aim to study in the social sciences that deal with organized complexity (Weaver, 1948). Hence, 'collectives of statistics' are 'emphatically not wholes in the sense in which we describe social structures as wholes' (Hayek, 1952a, 124). Statistical wholes ignore, and at times even radically alter, context and the specific properties and relations of the parts, and hence they fail to convey the manner in which the parts had been positioned in the system and orderly connected, even though such connections and contexts are actually the generative features of complexity (Lavoie, 1985; Lawson, 1997, 2012). Consequently, statistics as a method is unsuitable to deal with organized complex phenomena because the techniques of thought, the treatment of the data, and the assumptions it employs actually transform the underlying data about the parts, their properties, and their relations, and thus it disregards the properties that generate complexity (Weaver, 1948).

Beyond these methodological shortcomings of statistics to deal with organized complexity, Hayek (1952a, 2014 [1964]) and Weaver (1948) also suggested that complex systems might display additional novel emergent properties. These properties could render the analytical and logical relationship between the formalistic, statistical, and reductionist methods currently employed in the social sciences and emergent complex phenomena problematic at best, or entirely incompatible at worst (Colander and Kupers, 2014, 121). This is because the social and organized wholes we aim to study in the sciences that deal with complexity are largely produced by the

> 'emergence' of 'new' patterns as a result of the increase in the number of elements between which simple relations exist. [This] means that this larger structure as a whole will possess certain general or abstract features which will recur independently of the particular values of the individual data, so long as the general structure . . . is preserved. Such 'wholes', defined in terms of certain general properties of their structure, will constitute distinctive objects of explanation for a theory. (Hayek, 2014 [1964], 261–262)

Similar remarks regarding emergence have also been made by M. Polanyi (1966) and Mayr (1985) among several other scientists (Hodgson, 2000b). They recognized that one of the crucial characteristics that defines organized complex systems concerns emergent and novel properties that arise from *specific* and highly contingent orderly interactions. Moreover, Polanyi acknowledged that, given their emergence and novelty, these properties and organizing principles cannot be reduced to and represented by the specific laws, intrinsic properties, and narrow principles that originally governed the isolated parts (Polanyi, 1966, 36). Thus they saw that emergent properties of complexity cannot be explained merely by the original properties of the parts, by the frequencies at which certain classes of the parts appear, by any partial combination of the properties or frequencies of the parts, or by the (linear or simple) sum of those original parts (Hodgson, 2000b). Hence these novel and emergent properties identified, once more render statistics—and most of reductionist methods for that matter—methodologically unsuitable to deal with complex phenomena.

These emergentist arguments against the use of radical reductionism to analyze complex phenomena resonate with Hayek's aforementioned remarks on why statistics are unable to illuminate complex phenomena. This is because statistics ultimately attempts to engage in a form of radical reductionism, or rather a type of severe conceptual simplification (transformation) of the complex whole. Statistics, by its own proceedings and methods of treating the data, conceptually avoids dealing with the subject matter of complexity, in which it is the position and interconnectedness of the parts that matter (Colander and Kupers, 2014; Hayek, 2014 [1964]; Lawson, 1997). This is clearly an illegitimate reductionist undertaking in studying complex phenomena since emergent properties and the characteristics of complex systems 'cannot (not even in theory) be deduced from the most complete knowledge of the components, *taken separately or in other partial combinations*. In other words, when such systems are assembled from their components, new characteristics of the new whole emerge that could not have been predicted from a knowledge of the components' (Mayr, 1985, 58, emphasis added).

Put succinctly, this discussion on statistical analysis's limited analytical and methodological ability to shed light on complexity alludes to three important features of complexity. First, not only do the structures of organized complexity require a large number of elements, but also they require that those elements must establish homogenous, specific, and orderly interactions among them. This means that they require establishing purposeful and 'orderly relations' among the parts. It is now known that complexity is closely related to the scale of the array and to the number of elements that compose it (Anderson, 1972). But more importantly, Hayek (2014 [1964]) argued that what is ultimately fundamental and causal for complexity to arise is the establishment of orderly and similar relationships among elements; thus it is required also that the elements need to be interconnected in the *same kinds* of 'simple and orderly relations' (Weaver, 1948).

Second, organized complexity possesses some novel qualities, emergent properties, and new general abstract features *not* present in or engendered outside of specific institutional and contextual processes of interactions (Buchanan, 1982; Lavoie, 1985; Paniagua, 2018a, 2018c, 2019a). These are moreover ontologically different, irreducible to, and largely independent from the intrinsic and original properties of the unrelated individual parts (or even their sum) that *originally composed* the order (Mayr, 1985). Thus the notion of emergence is a crucial feature of complex systems and is also conceptually indivisible both from the organized and orderly interconnectedness of the parts and from the specific institutional context (or rules) that defines them (Hodgson, 2000b; Lewis, 2015).

Third, emergent properties do not depend largely on the inherent properties of the individual parts composing the whole, nor do emergent properties depend on aggregating the specific properties of the parts. Furthermore, emergent properties are largely independent of the frequencies at which the original properties of the separate agents that constitute the whole appear (Alchian, 1950; Ostrom, 2005). Concerning complex properties, 'to some extent they do not depend on [and are not contained within] the idiosyncratic states of the elements they are composed of' (Axtell, 2014, 23). Instead, they mainly depend on both the general structure of the order and on the system of rules that defines the interactions among a large number of elements (Alchian, 1950; Axtell, 2014). Emergent features of complex systems largely depend on the institutional structure in which the elements are interacting, rather than on the intrinsic and original properties of the parts (Alchian, 1950; Ostrom 2005). In the following sections, I will explore further these features in light of the recent literature on complexity, emergence, and macroeconomics.

1.2 Four Features of Complexity and the Methodological Procrustean Bed

In this work, using four core features of complex systems in attempting to reconceptualize macroeconomic outcomes as emergent phenomena has important implications. First, it assists in understanding the limited ability of current formalistic approaches in macroeconomics to engage seriously with complexity. Second, it unveils the crucial causal role of monetary and banking institutions in forming emergent complex macro orders. Finally, the analytical and methodological limitations of both statistics and modern macroeconomic models in attempting to illuminate complex phenomena are mostly derived in this chapter from the presence of four inherent features of complexity. These four crucial properties, which I will explore in this section, actually drive the emergence of complex systems, yet they are deeply and philosophically incompatible with modern macro's methodological criteria and reductionist assumptions.

First, complex systems that display organized complexity comprise a large number of elements that are related to each other and interact in particular ways (Hayek, 2014 [1964]). Organized complexity is characterized firstly by the existence of a very large number of purposeful elements that establish simultaneous and interconnected ways of behavior among them (Hayek, 1952a). Hence the parts are all interrelated in a complicated fashion—but not in individually erratic or unknown, helter-skelter ways—thus forming an organic whole (Weaver, 1948). An organized system is 'a coherent structure of causally connected . . . parts' (Hayek, n.d., 4). Thus, '*only certain kinds of regular arrangements*' can actually produce an order (Hayek, 2014 [1964], 258, emphasis added; see also Lewis and Lewin, 2015).

Second, the particular and orderly interactions between the parts are what constitute the system's core structure, and they are also the causal generative mechanism that produces a complex order and its emergent properties (Colander and Kupers, 2014). Moreover, given the myriad of intricate, local, and dynamic interconnections, these interactions cannot be entirely understood and represented in full detail; however, they can be largely explained and described *indirectly* and *in general terms* either by the system of rules or the institutional framework that configures them (Lewis, 2015). Thus while it is impossible to know, model, and fully detail the myriad of interconnections (Colander and Kupers, 2014, 15; Hayek, 1952a, 105–106), they can nonetheless be described in terms of the sets of rules, replicator dynamics,

and institutions that define the general principles that guide those relations and the interactions of the parts (Lewis and Wagner, 2017).

The key feature then in analyzing orderly interactions and organized complexity—while bypassing the intractability of formalizing the whole dynamic network and the impossibility of accounting for the myriad of interactions that generate the complexity—is being able to identify their specific governing rules and institutions, or their 'replicator dynamics' (Colander and Kupers, 2014, chapter 4). The replicator dynamics, or meta-rules, are the (broadly understood) 'formulas' and 'programs creating the patterns' (Colander and Kupers, 2014, 112). Thus meta-rules that define relations are in reality the fundamental aspect generating 'persistent structures of relationships' (Hayek, 1952a, 142).

The above suggests that the complex wholes are 'defined in terms of certain general properties of their structure' and rules (Hayek, 2014 [1964], 262). Consequently, in a complex order, there must be a set of institutions, rules, or a physically guided structure that governs the general principles and properties of orderly interactions (Lewis, 2015). Particular institutions therefore define and require that the individual parts will interact with each other only in certain and orderly ways, proscribing others, hence producing an order (Hayek, 2014 [1967], 285; see also Ostrom, 2005).

The third relevant property of complexity is that the orderly system that forms (when the parts relate to each other in the appropriate manner) generates new properties that could never have been predicted even with full knowledge concerning the properties of each part (Colander and Kupers, 2014, 130; Lawson, 1997). These properties are ontologically and qualitatively distinct from the sum or aggregation of all the original, and intrinsic, properties possessed by the parts before engaging in the system of relations (Axtell, 2014). Since individual parts stand in specific positions and orderly relations to one another, such emergent properties are inexplicable by, and causally and ontologically irreducible to, mere intrinsic and isolated properties of the parts or even their linear sum. The inherent and unrelated properties of agents—either taken separately, partially combined, or taken as a sum—also fail to explain and represent the emergent and novel properties present in such systems (Mayr, 1985).

Hence the hallmark of emergence resides in that 'a certain combination of . . . structures produces an overall structure possessing distinct characteristic properties' (Hayek, 2014 [1964], 261). Consequently, emergent properties are highly institutionally and relationally dependent (Hayek, 1973; Hodgson, 2000b). Thus they depend not only upon the presence of inherent attributes among the elements, nor just on their large numbers within a structure, but also, and perhaps most importantly, on their *standing* in certain coherent and *institutionally specific* relations with one another (Alchian, 1950; Lavoie, 1985; Ostrom, 2005). This feature renders them ontologically and causally irreducible to, and inexplicable by, the intrinsic properties of the agents or their sum (Lawson, 1997).

Fourth, emergent properties of complex systems form a constant, endogenous, and unpredictable source of novelty and radical uncertainty (Buchanan, 1982; Lewis and Wagner, 2017). These complex systems exhibit 'perpetual novelty in the system as mutations lead it to evolve new ecological niches' (Rosser, 2004, 47). Hence the features of rule-guided interactions, endogenous perpetual novelty, and radical emergence lead us to recognize the fourth property of organized complexity: a fundamental lack of steadiness within these systems, meaning the radical absence of any general-equilibrium state or endogenous tendencies toward one (Colander and Kupers, 2014). Hence these systems exhibit constant 'out-of-equilibrium dynamics with either none or many equilibria, with little likelihood of a global optimum' (Rosser, 2004, 47).

The presence of emergence and the endogenous recurrence of novel properties indicate that complex systems cannot be meaningfully conceptualized as static equilibrium outcomes (Lewis, 2015). They cannot be conceptualized as such because the existence of equilibrium would imply that an end state, or a lack of novelty and endogeneity within the system, has been or could be reached; therefore, the system

of relations and the interconnectedness among the parts would have ceased to work, and thus they would no longer be producing generative mechanisms and perpetual novelty (Axtell, 2014). Alternatively, complex systems, which display the features of emergence and novelty, can be better conceptualized as orders, such as the idea of a 'basin of attraction' whereby the parts' constant dynamic changes and interactions sustain a higher-level pattern or organization (Axtell, 2014; Hayek, 1973).[8] Equilibrium excludes the idea that higher-level patterns and ontological transformations of the parts to the whole are actually generated by change and dynamic interaction of the parts (Lawson, 1997).

Based on these four aforementioned properties, we can recognize that the macroeconomy and complex macroeconomic wholes that arise from market settings—also based on similar kinds of orderly (monetary) relations established by purposeful agents that compose them—are really much more than the mere sum or aggregation of the parts that constitute them (Colander and Kupers, 2014; Keynes, 1936). Indeed, it has recently been recognized in the literature (see for example Holt, Rosser, and Colander, 2011; Kirman, 2016) that the macroeconomy seems to possesses the four features that define organized complex systems: causally connected parts; (monetary) interactions defined, in general terms, by systems of monetary rules and frameworks; emergent properties not contained within the properties of the parts; and out-of-equilibrium dynamics (Axtell, 2014; Howitt, 2012; Lewis and Wagner, 2017; Rosser, 2004; Wagner, 2012). Thus the macroeconomy truly resembles an *ecology of monetary interactions* (Wagner, 2012); and thus it also critically depends 'on the [rule-guided and monetary] manner in which the individual elements are connected with each other' (Hayek, 2014 [1975], 365). Indeed, for Hayek (1973) and Keynes (1936), the most paradigmatic example of an emergent, complex, and orderly system is the market economy and its macroeconomic emergent structure (Colander and Kupers, 2014).

Thus, by extrapolating and by taking into account the four properties of complexity in economic analysis, it seems clear today—for most economists at least—that the macroeconomy resembles a complex system much more than a linear and mechanical one, and thus it possesses the four features that distinguish organized complexity (Holt et al., 2011; Rosser, 2004). Indeed, 'over the last several decades the view that economic reality is somehow fundamentally complex has increasingly taken hold among economists' (Rosser, 2004, 45). This has been further underscored after 2008 by the deep failure of macroeconomists in attempting to predict and control the business cycle and in micromanaging macroeconomic fluctuations (Caballero, 2010; Calvo, 2013; Howitt, 2012; Romer, 2016). Consequently, as Hayek (1973) and Keynes (1936) recognized, if the macroeconomy resembles a complex system, then it must be treated analytically and conceptually as such; otherwise the analysis will miss important and causal elements. Indeed, based on that philosophical recognition of complexity, both Keynes and Hayek advocated a nonformalist, nonlinear, and pluralist methodological position in economics and a complexity vision of what constitutes the aggregate economy (Colander and Kupers, 2014, 38–40).

As suggested above, Hayek and complexity scientists today seem to have subscribed to a nested framework of different levels of organization in society or to a general type of 'layered ontology' in complex systems; in other words, they have subscribed to a view of nested types of emergent orders, particularly in the macroeconomy (Lewis and Lewin, 2015; Lewis, 2015; see also Hayek, 1973, 2014 [1975]). The above means that complex social phenomena, particularly the macroeconomy, are ontologically real and they differ in complexity from the sum of the parts that generate them. This is because they exhibit dramatic transitions, phase and ontological changes, and novel properties in dimensions and qualities that are absent within the complexity level of the parts and their partial combinations (Kauffman, 1996). This alternative vision concerning the 'layered ontology' of economic reality suggests that the nested kind of relation between microeconomic reality and macroeconomic phenomena can no longer be conceptualized coherently as a simple matter of aggregation or multiplication or as a linear scaling up from the micro properties to the aggregate (Lawson, 1997).

[8] Order is here conceived as: 'a state of affairs in which a multiplicity of elements of various kinds are so related to each other that we may learn from our acquaintance with some spatial or temporal part of the whole to form correct expectations concerning the rest, or at least expectations which have a good chance of proving correct' (Hayek, 1973, 36).

This critically indicates that the macroeconomy can no longer be represented and treated as if it were displaying the same types of nature, phenomena, and properties that occur at the level of the parts (Wagner, 2012). Importantly, the philosophical concept of the macroeconomy as a complex system displaying a nested and layered ontology (Lewis, 2015) poses severe analytical and methodological challenges to current reductionist macro models and formalist methods in their ability to illuminate such nested and emergent economic reality. The philosophical notions of layered ontology, emergence, and irreducibility in economics suggest that it is incoherent, and thus a conceptual and methodological mistake, to treat the relationship between micro and macro as one of simple linearity, of ontological and complex homogeneity, and thus as a mere matter of scalability among similar phenomena (Wagner, 2012; Hodgson, 2002b).

The inherent and unavoidable presence of these four explored features defining organized complexity and the macroeconomy make it analytically difficult and methodologically challenging for scientists to coherently extend and apply statistical and formalistic methods to shed light on complex systems without falling also into questionable assumptions concerning the lack of emergence, the 'unnested ontology', and the radical reducibility of the macro phenomena to the isolated component parts (Wagner, 2012). Alas, all such questionable assumptions are concomitantly carried through scientists' attempts to extend and apply such formalistic methods to render complex phenomena intelligible, tractable, and mathematically coherent. However, by the use also of such hand-waving and reductionist assumptions, social scientists concomitantly are paradoxically and conceptually eradicating those very same crucial complexity properties that should have been taken into account to render the phenomena coherent and actually distinct from the parts. This suggests correspondingly a kind of analytical paradox or a methodological dilemma in the social sciences that wish to study complex phenomena.

Hence, the above proposes a crucial analytical dilemma between, on the one hand, relying on mathematical refinement, formalistic elegance and logical simplicity, and statistical tractability with their unavoidable, questionable, and reductionist assumptions and, on the other hand, the scientific (but nonformalist) attempts to take analytically and seriously into account the four key properties of complexity examined. The aforementioned echoes with what Caballero (2010) has identified as a fundamental an unavoidable methodological tension in macroeconomics; meaning 'the tension between a type of answer to which we aspire but that has limited connection with reality (the core [modern macro]) and more sensible but incomplete answers (the periphery [unorthodox explorations in macro])' (Caballero, 2010, 86). This is a deep, inherent analytical paradox, or a conceptual trade-off, that seems to plague most of the scientific and formalistic attempts to formalize and study complex systems and the attempts to render them mathematically tractable and coherent (Axtell, 2104; Rosser, 2004).

This methodological and analytical dilemma identified above relates to the fact that in their attempts to be narrowly scientific and precise by applying statistical, formalistic, and mathematical methods of analysis, social scientists in general, and economists in particular, are *simultaneously* employing unavoidable, but questionable, assumptions, reductionist techniques of thought, and numerical procedures and transformations that analytically and conceptually preclude and/or negate the complex system's existence, its crucial causal properties, and its ontological uniqueness.

This narrow and paradoxical way of scientifically confronting complex phenomena by mere radical reductionism unfortunately obliquely continues by disregarding the causal mechanisms generating complexity, as well as the properties that make these phenomena organizationally and ontologically distinct from the comprising parts. In other words, in order to render complex phenomena tractable and coherent with our own narrow conceptions and visions of science and our preferred formalistic methods of analysis, scientists (particularly economists) are transforming and severely simplifying the organized complex phenomena in question so that they (the phenomena) can fit our modern and narrow definitions of 'rigorous' and 'scientific' analysis.

Consequently, complex phenomena, such as the macroeconomy, are forced analytically and conceptually to fit the methods of our liking, rather than the other way around. Thus in dealing with complex phenomena, social scientists are currently seeking to fit them within their own narrow methodological preconceptions or methodological Procrustean bed, rather than adapting or replacing the scientific methods to the properties of the phenomena we seek to study. However, in doing so, scientists are analytically cherry-picking only the tractable and manageable aspects of the phenomena, while discarding the four more problematic, intractable, but crucial and causal, properties reviewed here. This is, as Hayek (1952a) and Ostrom (1982, 2010) recognized, a treacherous road for the sciences that have to deal with complexity, leading toward an unscientific and dogmatic attitude, or a form of 'scientism'.

To conclude, it seems today that macroeconomics is actually deploying such a methodological Procrustean bed. We are forcefully attempting to make macroeconomic complexity fit our preferred methods and fancied frameworks of analysis, rather than the other way around. Nevertheless, this is done at the extreme cost of eliminating crucial causal parts of the phenomenon and severely damaging the economic reality that we originally should have been concerned about illuminating, rather than obscuring. The next section will extend and apply the four features of complexity into macroeconomic analysis; thereafter, the section will deeply challenge the current methodological criteria being employed in macroeconomics. Further, these properties indicate that current reductionist approaches in modern macro and dynamic stochastic general equilibrium (DSGE) models are actually deeply flawed, both conceptually and methodologically, at handling the macroeconomy's fundamental features (Caballero, 2010; Romer, 2016). More problematic still, because of its reductionist practice, methods, and Procrustean framework of analysis, modern macroeconomics is currently unable to illuminate the core features that drive (constitute) complex economic phenomena and thus paradoxically unable to shed light on its own subject matter.

1.3 Current Macroeconomic Models and Their Incongruities with Complexity

The four reviewed properties of complex systems help to shed light also on the key shortcomings and analytical limits of using general-equilibrium models, statistical analysis, and DSGE models to understand the macroeconomy as an emergent complex reality. By exploring the four aforementioned properties of organized complex phenomena, I also concomitantly recognize in this section where the conceptual and methodological shortcomings and intellectual blind spots of current macroeconomic DSGE models reside.[9] Hence in this section I focus on the underlying methodological criteria and assumptions contained within macro DSGE models because these models are currently used by central banks as the major and most prominent tools 'for projection and policy analysis' (Howitt, 2012, 14).

Essentially, DSGE models and modern macroeconomics in general are unable to recognize that macroeconomic phenomena are *conditioned* emergent qualities of monetary interactions within a particular societal and institutional framework (monetary constitution) that defines those monetary networks and interactions. Macroeconomic DSGE models face three critical methodological and analytical shortcomings in properly dealing with the aforementioned features of complexity. Indeed, in examining the following three analytical incongruences and methodological shortcomings of current macro models, I show that DSGE models are correspondingly deeply incompatible both with understanding economic emergent reality and with treating the macroeconomy as a complex system.

First, neo-Walrasian conceptualizations of the economy and DSGE macro models overly rely on

[9] For specific details of DSGE models, consult Blanchard (2016), De Grauwe (2010), Howitt (2012), Korinek (2015), Romer (2016), Smets and Wouters (2007), or McCallum's (2014, 158) specification of a 'standard three-equation New Keynesian (NK) model.' These models are characterized by a three-static-equation system, or common core, in which the first equation is an expectational IS curve, the second equation is an expectations-augmented Phillips-style curve, and the third is an interest rate–targeting type of Taylor rule. The unknowns in each are real income, the inflation rate, and the nominal interest rate, respectively (McCallum, 2014). Despite subtle differences, all DSGE models share the same underlying assumptions, methodological criteria, and the strict methodological restrictions reviewed in this section (on this see also Korinek, 2015).

conceptualizations of systemic equilibrium and constant effortless adjustments toward general equilibrium (assumed tendencies to always *revert back* towards its steady state), which are conceptualizations originally derived from the classical general-equilibrium theory (Axtell, 2014; Colander, 2006; Kirman, 2010; Korinek, 2015). These static or 'steady state' conceptualizations are ultimately incompatible with the properties of complexity regarding emergent phenomena and endogenous change (the third and fourth properties explored in the previous section) (Korinek, 2015). After all, the DSGE model 'is an applied general equilibrium model that is considered as more scientific than earlier models since it is based on microeconomic foundations' (Kirman, 2010, 500).[10]

Thus, despite DSGE models' possibly being grounded on 'more scientific' and highly formal microfoundations, they nonetheless firmly rely on Walrasian general equilibrium and systemic-static notions (Colander, 2006), which conflict with the ideas of dynamic agents' interactions and of an emergent order being sustained only through constant processes of change and dynamic relations among the parts (Axtell, 2014). Moreover, the DSGE modelling approach has strong conceptual biases toward assuming infinite time horizons with a 'well-behaved ergodic steady state' (Korinek, 2015, 3). Thus, these models are not contingent on notions of order, internally generated structures, and organizations derived from changes among parts. In other words, these models are unable to convey the idea that an overall 'order can be preserved throughout a process of [endogenous] change' (Hayek, 2014 [1968], 308). Consequently, and according to Korinek (2015), these 'steady state' assumptions:

> may be problematic because there are many real-world processes for which it is not obvious that they follow a defined ergodic distribution. If an economy is assumed to always revert back towards its steady state, there is much less concern about destabilizing dynamics than there may be in the real world. (Korinek, 2015, 3)

For macroeconomists, obtaining a unique and stable equilibrium is analytically important. Comparative statics, through which we can compare equilibrium states whenever we change the parameters, makes no sense in the presence of endogenous change (Kirman, 2010). Macroeconomists found a way out of this problem by assuming the presence of a single representative agent for the whole economy in order to obtain a single and stable equilibrium (Kirman, 1992; Smithin, 2004). Furthermore, assuming equilibrium enables the construction of closed-system types of tractable and solvable mathematical models of the economy (Colander, 2006). However, the dynamic and orderly interactive processes of the relations among parts, by which the emergent properties of macro coordination can only arise, are entirely assumed away (Kirman, 2010).

Equilibrium in economics does not consider the fundamental issue of how macro states are initially generated or come about or how they are sustained by dynamic processes at various lower (less complex) levels of reality (Lawson, 1997). The assumption of equilibrium and the assumed capacity of economic systems to reach a single-equilibrium end state are fundamentally at odds both with ontological and complexity transformations that rest upon processes of interaction and with the notion of endogenously generated order that actually defines complexity (Lewis, 2015). In other words, the assumptions of equilibrium, static orders, and end states are profoundly at odds with the notion of a higher-level order sustained by the parts' constant dynamic changes and interactions, which is the fourth crucial property that defines organized complexity as reviewed in section 1.2.

The second and third analytical and conceptual shortcomings of current macro models in dealing with organized complexity jointly stem from their unrealistic and highly reductionist approaches and their atomistic (radically isolated) individual basis for constructing models of simple aggregative behavior. This

[10] Smithin has recognized that the 'microfoundations quest' of macroeconomics is 'the pure theory of individual "choice", essentially divorced from the institutional or social context in which the choice is supposed to take place. The insistence on microfoundations . . . is therefore the insistence that an explanation of macroeconomic phenomena should be based on the logic of the outcomes of the . . . atomistic agents, without reference to any higher-level social structure' (Smithin, 2004, 3).

means adopting the unwarranted assumption that macroeconomic aggregates correspond linearly to, and behave much like, a scaled-up, enlarged, and linear representation of the hypothetical choices made by a single and isolated representative individual (Korinek, 2015; Wagner, 2012).[11] Indeed, as Caballero also recognized, estimating the parameters of macro models based on microfoundations, 'may be a reasonable estimate for an individual agent facing a specific micro decision, but what does it have to do with the aggregate? . . . why do we call this strategy microfoundations rather than reduced-form?' (Caballero, 2010, 89). Implicitly, this reductionist way of interpreting the economic order assumes that monetary (and other media of) social relations, institutional contexts (rules that define interactions), higher-level social structures, and heterogeneity among the parts are unimportant features for producing a conceptually different and complex order.

The current unrealistic and reductionist approaches in macroeconomics, built upon both the microfoundations dictum (see footnote 10), and based on the assumed existence of a single and representative agent (see footnote 11), are responsible for the following two analytical shortcomings and theoretical incompatibilities present in modern macro models which I will review below. Particularly, the second critical shortcoming of these DSGE models relates to a lack of emphasis on and analysis of systems of social relations and the complexity-based role of monetary interactions among agents (on this see also chapter 2). The third shortcoming relates instead to the models' radical analytical divorce from any institutional considerations (or higher-level social structures) and from any analysis and comparisons of monetary rules and the social contexts that specifically define and determine the interactions of the agents; and thus these models are divorced from the final form of complex macroeconomic orders and their institutionally contingent emergent properties.

In regard to the second shortcoming, it has been recognized that 'our models are based on the same fundamental building blocks. The most important of these is the idea that individuals act in isolation. . . . All that we have to do, to deduce the behavior of the economy at the aggregate, or macro level, is to add up the behavior of the individuals who make it up. Furthermore, the theoretically unjustified assumption is made that the behavior of the aggregate can be assimilated [linearly represented] to that of an individual' (Kirman, 2010, 501). Hence macroeconomics maintains the pretense of scientific and formalistic rigor by following the reductionist microfoundations program and thus restricting the analysis to closed-systems types of optimization problems, which only the representative (non-interacting) agent solves (Korinek, 2015). This maximization analysis occurs without any reference to agents' heterogeneity, social positioning, systems of relations, or social structures (institutions) that bind them (Lawson, 1997; Wagner, 2012).

The reductionist and simplistic assumption of representing the whole macroeconomic order by a single, and highly rational, representative agent shows how far macro DSGE models have abstracted from social structures, causally connected parts, interactions, and systems of social relations. Indeed, as Howitt unfavorably recognized, 'the idea that the entire household sector of say the US economy is just a blown up version of a single person is on the face of it about as bold and unlikely a hypothesis as one could imagine' (Howitt, 2012, 14). Furthermore, by disregarding interactions in its microfoundations and assumptions, unjustified macroeconomic reductionism conceals also any possibility of considering the existence of radical emergence and novelty and thus the possibility also of nested complex systems.

[11] The representative agent is this mythical character whose choices are supposed to reflect *all* the choices made by society (Howitt, 2012; Kirman, 1992). The representative agent's choices are literally taken to be illustrative—in other words, a direct representation—of the aggregation of the choices made in the entire economy. Under such an idealized, and isolated, 'single representative household' model, there is no trade nor interactions, and therefore no need at all for mechanisms of social relations, such as language or money (Howitt, 2012; Kirman, 1992, 2010). Even more problematic is that 'at the operational level, the first order conditions . . . of the representative agent's maximization problem are taken to be valid mathematical expressions also of aggregative behaviour' (Smithin, 2004, 4). It is this sole assumption which implicitly suggests that macroeconomic and aggregate behaviour correspond linearly to, and behave much like, a scaled-up, enlarged, and linear representation of the hypothetical choices made by such mythical single and isolated representative agent.

Representative-agent DSGE modeling therefore questionably assumes that aggregated outcomes and macro variables are linear, scaled-up, and magnified versions of the original variables that constitute the isolated agent's optimization problem (Korinek, 2015; Wagner, 2012). Accordingly, it illegitimately assumes that the macro variables and the representative agent's constrained-optimization variables are ontologically and qualitatively equal and thus homogenous and analogous in complexity. In turn, this severely negates the role of interactions, systems of relations, and emergence in deeply affecting the economic and ontological reality and the *nonlinear* relationship between micro and macro phenomena (Lewis, 2015). Problematically, this mistakenly implies also that both (the micro and the macro) socio-economic domains possess similar, homogenous, and reducible properties and that they face the same ontology and degree of complexity; this misleads social scientists regarding what they can know, manage, and predict about aggregated and self-organizing systems (Hayek, 2014 [1964]; Romer, 2016).

Consequently, these issues concerning a lack of analytical consideration of social relations, the large number of dissimilar agents, and the agents' interactions are at the core of the second shortcoming of macroeconomic models in illuminating complex phenomena and their properties. Because of radical reductionism, linear and simple scaled-up representation of the social order, and the assumption of a single representative agent, these models' conceptual and formalistic explanations (simplifications) of macroeconomic phenomena are incapable of shedding light on systems of social relations and orderly interactions among parts; and therefore they are unable to illuminate the emergent properties exclusively generated by such orderly systems of relations (Hodgson, 2002b; Lawson, 2012). Accordingly, these reductionist assumptions severely negate the existence of the first and third features of organized complexity reviewed in the previous section. In other words, they are profoundly and theoretically incompatible with the notions of both a 'coherent structure of causally connected . . . parts' (Hayek, n.d., 4) and the novel properties of emergence that stem from them.

Finally, the above discussion about the questionable reductionist assumptions currently employed in modern macro leads us to recognize the third and final key analytical shortcoming of DSGE models, meaning: they severely disregard the social and institutional structures (higher-level social structures) that frame and enable particular sets of orderly interactions while proscribing others (Hodgson, 2000a; Smithin, 2004). Essentially, resorting to the mythical and isolated representative agent for formal modeling—thus implicitly assuming that the *interactions* among heterogeneous agents do not matter for producing macro phenomena—correspondingly requires also assuming away the entire role of the higher-level social structure and the properties of the institutional framework that define and guide the organization and general behavior of those orderly interactions (Hodgson, 2000b; Kirman, 2010).

This one-dimensional way of treating the relationship between micro and macro has deep implications for the way macroeconomists analytically disregard the role of monetary institutions and banking rules in forming and determining complex macroeconomic phenomena. DSGE models just presume a coherent, simple, and direct link, at the same level of complexity and ontology, connecting these two socio-economic realms. By assumption, macro models thus conceptually force the two entirely distinct socio-economic realms to be actually, but wrongly, ontologically and qualitatively indistinguishable (Wagner, 2012). Hence DSGE models illegitimately collapse micro and macro phenomena conceptually onto the same level of ontological reality, assuming then also homogenous uncomplex properties, when in fact, as showed in section 1.2, they are entirely different because of the existence of rule-guided interactions and radical emergence (Colander and Kupers, 2014; Lawson, 1997).

Accordingly, these reductionist assumptions negate also the existence, in macro, of the second property of complexity explored in section 1.2. By assuming away social relations, and by treating economic reality in this one-dimensional fashion, they preclude also any theoretical necessity to concentrate on and explore the properties of monetary institutions as the crucial ontological and complex link between the two ontologically and qualitatively *distinct*, but real, micro and macro social realms (Hodgson, 2000b; Lewis, 2015). Thus, 'few institutions play important roles in models today' (Axtell, 2014, 38).

Consequently, given both (1) the above arguments concerning macro models' limitations and their severe analytical and philosophical incongruity with complexity, and (2) the unavoidable presence of the four core features of complex phenomena within macroeconomic reality (see section 1.2), we can contend that DSGE models in particular, and most macro models in general, might become an ill-suited analytical and descriptive tool, and perhaps worse yet an illegitimate intellectual pursuit, for understanding the relevant and causal aspects that generate a macroeconomic complex reality *distinct* from the parts that compose it. This deep-rooted incongruity between contemporary formal frameworks of macro analysis and complex economic reality problematically suggests that DSGE modeling could become an illegitimate intellectual pursuit in macroeconomic research if our scientific goal is to shed light on the crucial features that make the macroeconomy irreducible to and distinct from both microeconomic phenomena and the parts composing it.

The problem highlighted in this section has been that 'in order to make the DSGE model tractable, they [macroeconomists] had to assume away almost all elements of complexity' (Colander and Kupers, 2014, 105–106), which paradoxically negates also the existence of the causal properties that actually produce the subject matter (macroeconomic phenomena). In this section I have argued that current macro models entirely negate and preclude the existence of the four causal properties of complexity via their unavoidable assumptions, tools of analysis, and methodological stance. By negating the causal properties of complexity, most macro models are ultimately assuming away also the existence in economics of emergent macro (higher-level) phenomena and hence paradoxically assuming entirely away the core subject matter that we are supposed to be analyzing.

Importantly, the issue is not that modern macroeconomic models use mathematics, abstractions, and assumptions per se, since most models by definition do that; the issue rather lies in which crucial aspects of the economy and reality are actually disregarded or concealed by employing certain types of mathematics and assumptions. Using abstraction to remove the inessential is the appropriate way to advance in economic and scientific inquiry; however, hubris and scientific problems arise whenever we use abstraction, not only to make things simpler along inessential dimensions, but also as a way to simplify (negate) reality itself, and thus to disregard its essential and causal elements (Caballero, 2010).

Furthermore, it is important to emphasize that 'the problem will not be whether the model as such is true, but whether it is applicable to (or true *of*) the phenomena it is meant to explain' (Hayek, 2014 [1955], 199). It has been argued in this section that macro DSGE models are analytically and methodologically inapplicable to, incompatible with, and perhaps even untrue of complex economic phenomena that social scientists seek to explain. Given that the macroeconomy behaves much like an organized complex system (Axtell, 2014; Caballero, 2010; Holt et al., 2011; Wagner, 2012), these modeling procedures, formalistic methods, and assumptions could be considered intellectually and scientifically objectionable, insofar as we consider economics as a science that should help us comprehend, rather than disregard, complexity and socio-economic reality. Indeed, as Caballero (2010) has recognized:

> [C]ore macroeconomics often has aimed not for a realistic anchor and a simplification of the rest . . . By now, there are a whole set of conventions and magic parameter values resulting in an artificial world that can be analyzed with the rigor of micro-theory but that speaks of no particular real-world issue with any reliability. (Caballero, 2010, 90)

The point has been to notice the deep analytical paradoxes and conceptual incongruences that plague current macroeconomic models when they attempt to deal with complexity and macro phenomena. The three explored analytical incongruences and methodological incompatibilities between modern macro models and complex economic reality are the fundamental reasons why these methods will persistently remain conceptually incompatible with the core features of complex phenomena and therefore intrinsically unable to illuminate macroeconomic reality. Social scientists must recognize that 'understanding a phenomenon requires building a plausible model that incorporates some of the

dynamics that are actually observed in the real system' (Colander and Kupers, 2014, 124). Insofar as macroeconomic models are incapable of incorporating and representing the reviewed core features of complexity and the emergentist dynamics that are actually observed in economic reality, they will continue to be inadequate as scientific means of understanding the macroeconomy.

To conclude, it seems that a unique intellectual Faustian bargain exists in macroeconomic research: economists are forfeiting a small amount of concrete knowledge about economic reality, complexity, and institutions in exchange for mathematical rigor, tractability, and the pretense of appearing scientific (Caballero, 2010; Romer, 2016). Alas, the ultimate price to pay for this intellectual Faustian bargain is high since this creates scientific hubris, a pretense of knowledge in macro, and a detrimental intellectual movement that paradoxically negates its own complex subject matter, shifting disturbingly far away from its original scientific task. I have argued that the underlying cause of the existent detrimental state of affairs in macroeconomics stems from the fundamental methodological incongruences and analytical tensions between: on the one hand, the self-organized and complexity properties of the subject matter under study, and on the other hand, the current methodological and formalist predispositions and the microfoundations-like precision that macroeconomists deem indispensable in order to claim a valid scientific status within the social sciences (Caballero, 2010, 100).

This tension between preferred and 'more scientific' methods of analysis, and the complex nature and properties of the material under study is not new either in economics, or in other social sciences (Hayek, 1952a; Hodgson, 2004). Indeed, the old institutional school (and also a few scholars within the new institutional tradition) responded to this challenge by concluding that the scientific task within macroeconomics and economic complexity was ultimately impossible to undertake merely through formalizing it in mathematical and closed-system terms (Coase, 1994; Hodgson, 2004; Ostrom, 1982; Samuels, 1987). Thus, their proposed solution to this crucial tension was to embrace methodological pluralism, via narrative descriptions, historical analysis and facts, and comparative institutional analysis.

Given the explored incompatibilities and incongruences between statistics, formalistic approaches, DSGE models, and macroeconomic reality as an organized complex phenomenon, a challenging question arises for the philosophy of sciences and economics: which analytical frameworks can be instead encouraged in macroeconomics in order to address crucial issues concerning institutions, organized complexity, and emergence? In the following section, I suggest that what could be needed is a nonformalist political-economic and institutional approach to the study of money. In other words, we might need to explore alternative political-economic frameworks for dealing with complexity, in order to 'not let this formalization [of macroeconomics] gain its own life and distract us from the ultimate goal, which is to understand the mechanisms that drive the real economy' (Caballero, 2010, 87).

1.4 Toward Macro-institutional Foundations of Economic Complexity

The discussion thus far has not been a mere ontological point about economics nor a minor and abstract exercise in philosophical reasoning lacking any repercussions for our ways of thinking and practicing economics as a science. Quite the contrary, understanding the enormous differences between how things really are in macroeconomic reality (see section 1.2) and how things are assumed to be in current macroeconomic thinking (see section 1.3) has deep implications concerning how we practice the discipline and how scientifically valuable it ultimately becomes. Exploring these immutable differences and incompatibilities potentially suggests a change of vision and practice and the adoption of alternative frameworks to more realistically and accurately engage in macroeconomics as a social science that analytically deals seriously with complexity. Therefore, the rather-philosophical themes explored in this chapter have practical and methodological implications concerning the plausible incorporation of alternative and unorthodox methods in economics that could be more suitable for engaging with macro complex phenomena and their causal properties.

It has been suggested here that acknowledging macroeconomic complexity and its properties demarks the actual analytical and conceptual limits of how far formalistic approaches and current mathematics can be coherently extended and applied to the realms of complexity and macroeconomics (Axtell, 2014). Thus at the level of formal modeling, the properties of complexity represent problematic aspects for the standard models, the systems of equations (particularly from the point of view of standard mathematics), and the entire microfoundations project (Kirman, 2010). Hence regarding formalizing economic complexity by the use of contemporary mathematics, the time has come to acknowledge that 'today there is no mathematics capable of describing such an economy' (Axtell, 2014, 42).

In order to overcome, or at least bypass, the explored methodological impasses, analytical inconsistencies, and radical reductionism, what seems to be needed in macroeconomics is, as Smithin (2004) argued, a theory of social ontology in monetary economics. In other words, macroeconomics needs a broader and more qualitative theory from which we can affirm the importance of institutions, social structures, and relations that form the nested 'monetary-ecosystem' that determines economic complexity (Wagner, 2012). To grasp complexity in macro, what could be analytically helpful is to engage in forms of institutional analysis coupled with a focus on comparing institutions and their effects on monetary relations and their emergent properties. This consists in focusing on the system of banking rules and the ways they affect incentives and interactions, or as Smithin stated:

> One of the main objectives would be to uncover those aspects of social structure . . . which are relatively enduring . . . and can therefore provide some type of theoretical explanation for the actual course of events. . . It establishes the crucial point the treatment of . . . institutions. . . What is required in economic science is . . . the 'macrofoundations of microeconomics'. . . . The social institution or structure which is most in need of investigation is that of money . . . [which is] the entire social apparatus of banks, central banks, and other financial institutions, which are involved in the production of money. (Smithin, 2004, 11–12)

Given the explored incongruences and difficulties of modern macroeconomics in dealing with complex economic phenomena, Smithin (2004) proposed moving the nature of the scientific inquiry toward both a higher-level focus on the meta-rules and the details and aspects of enduring institutional and social structures. In short, he proposed an intellectual move in macro toward institutional analysis, or the 'macrofoundations of microeconomics'. This analytical shift would mean scrutinizing and comparing the enduring aspects and core features of banking and monetary institutions because institutions provide the higher-level type of framework, which affects the interactions between agents as well as the emergence of complexity that stems from those interactions as explored in section 1.2.

Hayek (2014 [1964]), in a manner similar to Smithin (2004), was also quite emphatic about how institutions affect the emergent properties of complex systems. For Hayek (2014 [1955], 1973), one of the most important (if not the most important) focuses in the social sciences that deal with complex phenomena is the overarching rules and frameworks that generate and govern the general properties and patterns of interactions among the parts. Furthermore, Hayek (2014 [1967]) recognized that despite the fact that different sets of rules might have the same types of individual elements that constitute them, not all of those rules would produce the same kinds of positive emergent properties. Critically, this suggests that the types of elements constituting the whole and their intrinsic and isolated properties are secondary (and perhaps even irrelevant) aspects when it comes to determining the emergent and higher-level properties of complex systems (Alchian, 1950; Gode and Sunder, 1993, 1997; Ostrom, 2005, 100–103).

Indeed, the findings of Alchian (1950), Becker (1962), and Gode and Sunder (1993, 1997) concerning the fact that market efficiency is an emergent irreducible property of systems that is derived from certain sets of rules and particular frameworks that define the interactive arena of markets—rather than

rationally derived from sophisticated calculations and highly rational properties of the separate individuals—implicitly refute the fundamental building blocks and philosophical and scientific reductionist foundations of DSGE and representative-agent modeling. Thus, 'Alchian, as well as Gode and Sunder, show that it is the structure of markets that leads participants to make efficient choices rather than the assumptions . . . about the internal structure of individual valuation and choice' (Ostrom, 2005, 101).[12] Consequently, if the essential properties of the market economy are emergent phenomena, not contained in or explicable by the micro properties of the agents that compose them, then reductionist attempts and models that rely on the single-representative-agent assumption will be persistently unable to grasp and illuminate them. These (institutionally contingent) emergentist findings reinforce the idea that institutions, rules, and the macro-institutional foundations of macro are the crucial elements in significant macroeconomic analysis (Smithin, 2004; Hayek, 1973, 2014 [1975]).

Further, Hayek (1973, 43–44) also argued that detrimental social states and lack of order could still arise even under some rules and institutions that nonetheless create interactions and orderly patterns of regularities among the elements. This indicates that by engaging in institutional analysis and comparing their properties, we can seek to answer questions such as which kinds of rules will produce order in society and which kinds of order certain rules would produce (Hayek, 1973, 44). Hence Smithin's (2004) macro-institutional foundations of macroeconomics are intimately related with comparative institutional analysis.

Moreover, the crucial point to emphasize from Hayek's (1973) insights about emergent orders involves two insurmountable epistemological limitations: first, our actual limited knowledge concerning the full underlying data (the properties) of the parts constituting the whole; and second, the limited information about their ongoing and extensive relations. Both these elements are crucial for creating and conforming a complex situation (Hayek, 1952a). Thus in complex systems, there is a vast difference between, on the one hand, the information we might possess and what we can realistically access about the parts of the whole and their interconnections and, on the other hand, all the relevant data and properties actually required to produce a complex whole. This abysmal informational and epistemic difference severely challenges our capacity to model the information neatly and capture it in a mathematically and tractable manner.

Thus in the sciences dealing with organized complex phenomena, we encounter:

> [L]imited knowledge of the data of the complex situation. . . [We] cannot hope to know more than the types of elements . . . will scarcely ever know even of all the elements of which it consists and . . . will certainly never know all the relevant properties of each of them. . . . The number of separate variables which in any particular social phenomenon will determine the result of a given change will as a rule be far too large for any human mind to master. (Hayek, 1952a, 105–106)

In short, there are drastic informational limitations preventing one from knowing all the relevant data and the underlying information that ultimately produces the complex whole. Given such epistemic limitations on our ability to obtain all relevant data that constitute a complex system, there is no feasible way to create a single model that accurately and completely captures all of the important and ongoing interconnections or the intrinsic properties of the heterogeneous agents, which are elements that drive a

[12] It should be noticed that this notion of the institutional structure doing much of the explanation *instead* of the assumptions concerning the human nature is also Mirowski's (2002) argument in his book *Machine Dreams*. There, Mirowski calls into question the notion that economics has been immune to postmodern currents found in the larger Western culture, arguing that neoclassical economics has negatively participated in the deconstruction of the integral "Self", neglecting also institutions. Thus, Mirowski—similar to the arguments therein—argues for a different style of economics, blending computational and institutional themes. For an alternative view see also Hodgson (2006), which contends that this argument fails to distinguish between agent-*sensitive* and agent-*insensitive* institutions.

complex system (Colander and Kupers, 2014, 46, 136). Because, under such a system, the 'interconnections make it really complicated to describe and model a system precisely, because the mathematical formulas that characterize the system will have no ready solutions'; in other words, the 'interrelationships are so multitudinous and changing that standard equations can't capture them' (Colander and Kupers, 2014, 46, 136).

Therefore, a crucial concern for complexity and social sciences going forward is methodological and epistemological. It lies in being able to identify how one can best approach the task of understanding and representing such complex systems given that the relevant interactions and local properties of the parts that produce complexity are far beyond conceptual, epistemological, and analytical reach (Colander and Kupers, 2014, 15, 112; Rosser, 2004).

As the first property of organized complexity suggests, interactions, a higher number of agents, and agents' heterogeneity are important to create complexity (Anderson, 1972). Nonetheless, as argued above, profound epistemic and technical difficulties exist regarding knowing both all the relevant data about them and how to incorporate even the meager knowledge that we possess into the analysis without falling also into intractability and analytical and mathematical chaos (Axtell, 2014). Social scientists instead must find alternative methods and frameworks of analysis that allow us to account for the properties of complexity whilst bypassing the aforementioned conceptual and informational limitations that affect the abstract and formal models (Ostrom, 1982, 2010).

Consequently, in order to overcome these limitations, the analytical focus could instead reside on the 'ecostructure metapolicy' of the system, which requires 'deep institutional knowledge' (Colander and Kupers, 2014, 25, 30). Thus, in order to 'grasp how the system is likely to evolve, one can study the rules at the small scale and get a sense of how order can emerge spontaneously' (Colander and Kupers, 2014, 49). The particular (and insurmountable) informational and modeling difficulties briefly alluded to in this section, which also seem to be ubiquitous in complex systems, suggest actually that analyzing them could be done mostly *indirectly* through examining and comparing rules, 'replicator dynamics,' and institutions (Hodgson, 2000b; Wagner, 2012). This indicates that 'looking for . . . rules that govern the evolution of a system . . . is the primary way in which complexity social science differs from standard social science' (Colander and Kupers, 2014, 51).

This alternative and oblique focus recognizes that institutions within complex situations 'constitute a generative mechanism that, when set in motion by the behavior of the people whose (inter)actions they shape and structure, gives rise to the emergent causal power to coordinate people's plans' (Lewis and Lewin, 2015, 11). Hence importantly for the methods and philosophy of the social sciences, social complexity and the whole idea of macroeconomics as a complex system are conceptually and methodologically indivisible from institutional and rules analysis. Consequently, under this alternative vision of the macroeconomy, a major task of the social sciences that deal with complexity going forward must involve exploring alternative rules and institutional analyses, and thorough comparisons of their diverse incentive and informational properties.

Hence a plausible way to deal with economic complexity indirectly, yet scientifically, is to scrutinize and compare different institutional properties, the context-specific incentive structures, and the epistemic generating and learning mechanisms that different institutional arrangements possess and to study how those institutionally contingent properties affect social relations and the ways the parts interact to produce an order (Ostrom, 2005, 2010). Institutional comparisons and scrutiny will allow us to identify which sets of banking rules are robust and conducive to generating positive and wealth-enhancing macro orders (Ostrom, 2005; Wagner, 2012). In other words, 'the question which is of central importance . . . for social theory . . . is thus what properties the rules must possess so that the separate actions of the individuals will produce an overall order' (Hayek, 1973, 45). Focusing on the institutional framework and rules that structure and govern agents' monetary interactions provides a way to sidestep the aforementioned

problems concerning access to information, scarce knowledge about interactions and agents, and also the formal models' methodological and technical limitations and incongruences with the properties of complexity.

This alternative way of thinking about macroeconomics is what Smithin (2004) and Lewis and Wagner (2017) have denominated the search for the institutional macrofoundations of microeconomics. This means a *process-sensitive* institutional analysis that scrutinizes and compares how certain rules will affect people's monetary interactions, incentives, and knowledge. Thereafter, whenever the parts are structured by those systems of rules, their orderly exchanges will unintendedly lead to organized complexity and facilitate an order. The focus resides in studying *rule-contextualized* monetary-exchange relationships and their emergent properties, revealing how certain *monetary-exchange-governing* institutions encourage particular forms of economic interactions and proscribe others (Buchanan, 1964).

Accordingly, this dissertation seeks to contribute to the search for both new directions in macroeconomics and political economy, and also for the macro-institutional foundations of economic complexity through an institutional and nonformalist perspective on money. Put differently:

> In contrast to the orthodox micro-foundations project, which seeks to reduce macroeconomic phenomena to the behavior of isolated, atomistic economic agents, the approach advocated here would focus on attempting to identify the sets of social relations—and the systems of social rules that give rise to them. . . The central focus of macro-theory is the institutions in virtue of which the things conventionally regarded as macroeconomic phenomena exist. . . . Central to such an approach would be the examination of the comparative properties of different . . . institutions. (Lewis and Wagner, 2017, 13)

The quote concisely captures the core alternative focus, broad methods, and philosophical vision of the entire nonformalist approach undertaken throughout this thesis. The macro-institutional focus of the present work resides in three interrelated socio-relational, institutional, and complexity-based aspects about money and its surrounding banking institutions, as summarized in the following section.

1.5 Conclusions: Complexity Brings Macroeconomics Back to Its Classical Heritage

From the discussions on organized complexity and their conceptual and analytical implications for macroeconomics, a radical and challenging conclusion emerges. It is the paradoxical realization that the notion of macroeconomics does not really mean what most economists today think it means (Wagner, 2012). If the macroeconomy indeed behaves much like a complex and self-adapting system, possessing the four features of organized complexity (Rosser, 2004), then the idea of macroeconomics as a field of research could be instead defined as the institutionally and rule-oriented study of money, its processes of production (the apparatus of banks and central banks), and its associated complex and emergent phenomena. It also could critically refer to the ontological transformations of economic and epistemic features in society based on monetary relations. This philosophical redefinition of macro has implications for encouraging changes in the practice, methods, and analytical frameworks that macroeconomists could potentially adopt to accurately address the properties and nature of the complex subject matter.

Consequently, in order to study complex economic phenomena scientifically—yet not quantitatively—it is necessary to apply methods of analysis that are *dictated by* the nature and properties of the material under study (Hayek, 1952a, 77), not vice versa. The study of economics needs to be 'guided in the choice of its methods in the main by the nature of the problem it [has] to face' (ibid., 77), rather than the other way around, which is scientifically unsound (Ostrom, 1982). Accordingly, it would be judicious in the social sciences, to attempt to supersede the formal methods and frameworks that do severe analytical and conceptual damage to the complex reality we seek to study, with more sensitive and suitable methods that

do less damage to the idea of complexity and its properties. The radical, and also highly uncomfortable, conclusion of this chapter is that in order to tackle economic complexity in a constructive, scientific, and meaningful way, we have to eventually set aside most of the current models and techniques of thought, formalist methods, and closed-system ways of thinking about macroeconomics and money.

I have argued that if macroeconomic phenomena truly behave similarly to organized complexity, then we must follow alternative and creative methods and adopt heterodox frameworks of thinking that can address such phenomena's complex nature and core properties, rather than assuming them away just for the sake of preserving our preferred and 'more scientific' methods of analysis (Axtell 2014; Wagner, 2012). Consequently, economics as a social science embracing complexity may become more productive, useful, and truthful to the nature of the subject matter going forward by becoming Smithian in its inquiry, political-economic in its orientation, and institutional in its focus (Boettke, 2012; Colander and Kupers, 2014).

As explored throughout this chapter, if we take the complexity-based perspective in macroeconomics seriously, then the idea of macro simply refers to economic phenomena that emerge from institutionally contextualized monetary interactions among fallible, yet purposeful, individuals. In other words, '[t]he ultimate goal of macroeconomics is to explain and model the (simultaneous) aggregate outcomes that arise from the decisions made by multiple and heterogeneous economic agents interacting through complex relationships and markets. Neither the core nor the periphery [of modern macroeconomics] is able to address this incredibly ambitious goal very satisfactorily' (Caballero, 2010, 87).

The four causal properties of complexity pose a severe paradigmatic and methodological challenge to macroeconomics since they suggest that the manner in which macroeconomics is currently practiced and envisioned should perhaps be entirely different. I anticipate that a nonformalist institutional and political-economic analysis of money, one that sidesteps the explored methodological and reductionist shortcomings as well as the questionable assumptions of DSGE models, could more accurately capture the core properties and essence of organized complex phenomena.

This chapter has also suggested that there can be neither insightful nor meaningful macroeconomic analysis without institutional analysis, monetary interactions, and banking institutional comparisons. Thus macroeconomic entities and the entire macroeconomy are conceptually and methodologically inseparable from monetary institutional and rules analysis. Moreover, the nonformalist, yet institutional, mode of analysis suggested in this work echoes and relates closely with the classical economists' nonmathematical and descriptive methodologies and analytic-narrative approaches, and their sensitivity toward complexity and against hubris (Colander and Kupers, 2014; Mill, 1929 [1848]; Smith, 1981 [1776]; Hume, 2008 [1748]).[13] This relates also with what Boettke (2012) broadly denominated 'the economic way of thinking' (see also footnote 7). My aim has been to provide arguments to begin forming a compelling case for the analytical advantages of the Smithian political economist and institutional approach to macroeconomic and monetary analysis over the mainstream framework as an engine of social theory and inquiry that engages seriously with economic complexity.

Given the above suggestions for attempting to bring macroeconomics back to its classical heritage, the remaining five chapters of this dissertation are developed in the traditional form of verbal models, qualitatively and historical analysis, and logical analytic narratives. I apply these verbal models and the nonformalist 'economic way of thinking' to the role of money in society and the role of monetary institutions in producing macroeconomic complex phenomena (see also footnote 3). In short, while throughout this dissertation I attempt to shed light on the complexity-based role of money in society

[13] Interestingly, it was also Malthus one of the first economists that introduced the idea of complexity into economic analysis. In his economic disputes with Ricardo and elsewhere, Malthus argued that the complexity of economics and the uncertainty of economic action—using different terms at the time—placed severe limits on formal and mathematical approaches. On the economics of Thomas Malthus consult Hollander (1997).

and its surrounding institutions, the reader will not encounter any use of formal and mathematical models in this work. Their absence is to deliberately avoid the reviewed conceptual and methodological incompatibilities and analytical incongruences between them and the self-organized and complex nature of the subject matter under study.

The logical order of the remaining five chapters is as follows: First, the political-economic approach aims to identify the complexity-based role of money in creating a novel system of social relations (identifying the crucial set of social relations) that sustains the emergence of social knowledge (chapter 2). Second, I will seek to understand the rationale for, and role and evolution of monetary institutions (identifying the essential system of social rules), particularly central banks, and how they 'manage' and provide both crucial banking services and also the money supply (chapters 3 and 4). Third, and central to this nonformalist approach to macroeconomics, is an exercise in comparative institutional analysis that allows for comparisons between the epistemic and incentive properties of different institutional and banking alternatives (chapters 5 and 6).

Finally, following classical political economists such as Smith, Mill, and Hume, and following also contemporary political economists such as Buchanan, Hayek, E. Ostrom, and Samuels the following five chapters and diverse forms of engaging in the 'economic way of thinking' (Boettke, 2012) regarding money and its institutions are entirely verbal or narrative (verbal discussions), yet economically and institutionally oriented, in their expositions. Ultimately, I leave it to each reader to judge the scientific value, contributions, and the potential intellectual gains that these new directions and nonformalist explorations to money and banking may bring to macroeconomic thinking and more broadly to contemporary political economy.

Chapter 2

Money and the Emergence of Knowledge in Society[14]

> 'The basis of monetary order may indeed be the private knowledge of acting humans, but the *essence* of a monetary order is how that private knowledge becomes social and how such social knowledge makes an advanced, complex, and prosperous society possible'.
> S. Horwitz, 1992b, 9

The benefits and complexity of the commercial world would be unlikely without the use of money in exchanges. As Simmel (1978 [1907]) acknowledged, money is the essence of commercial modernity and social complexity. Despite this recognition, little else has been said about the crucial symbiotic and ontological relationships between money, social complexity, and the beneficial order formed in markets. Weber (1978) hinted at the crucial epistemic role of money in individuals' commercial cognition and in enabling rational calculation, opening the path for exploring the relationship between money and knowledge (see also Mises, 1981 [1922]; Mitchell, 1937). Despite the contributions of Simmel and Weber, not much else has been written in exploring the relationship between complexity, money, and knowledge (Horwitz, 1992a; Ingham, 1998; Lawson, 2016). This chapter seeks to bridge that gap in the literature by providing a complexity-based and social-ontological account of the relationship between money and emergent knowledge in commercial societies.

Following chapter 1, this chapter continues to apply the theory of complex phenomena and its core properties in order to illuminate the following: first, the socio-relational and complexity-based role of money in society; second, that role's implications for the formation of organized macroeconomic complexity in the form of emergent economic and social knowledge. As recognized throughout the previous chapter, one of the crucial features required to generate organized complexity resides in the fact that the elements that constitute the whole need also to establish a wide and dynamic network of *similar-in-kind* (homogenous) and orderly interactions. In other words, the elements that constitute the order need to create an orderly and organized system of social and purposeful relations among them (Weaver, 1948). Building on Hayek, Mayr, and Weaver, chapter 1—particularly sections 1.2 and 1.4—argued that the orderly system of relations and its dynamic composition and order are of fundamental importance for generating novel, positive, and wealth-enhancing emergence and thus organized complexity in the economic system.

The previous chapter also argued that the emergent properties and the ontological transformations of organized systems are complex properties derived from the orderly system of interactions that the elements of the whole establish between them. Chapter 1 concluded by arguing that the roles of both interactions and the media of relations to establish them are fundamental causal features of any theory of organized complexity (Lewis, 2015). Thus, given the conclusions of chapter 1 concerning the theoretical relevance of interactions and of systems of relations for creating macroeconomic complexity, this second chapter—by building on the complexity properties surveyed and enumerated hitherto—seeks to explore the complexity-based, epistemic, and ontological implications of using money in exchanges in order to create a system of socio-commercial relations.

[14] A modified version of this chapter was published in the *Review of Social Economy* (Paniagua, 2018a).

Consequently, using the ideas about organized complexity and macroeconomics developed in chapter 1 will help us here to acknowledge the fundamental and ontological reasons why money is relevant for coordinating the economy and thus *never* neutral in the macroeconomic order. In short, this chapter deals with money's epistemic and complexity-based relevance in commercial societies. Indeed, if the macroeconomy truly resembles an organized complex system, then one of its defining features seems to be the orderly system of exchanges that only money can sustain. Consequently, the core focus of this chapter moves from the macroeconomy as a complex order toward the specific role of money in generating such an order.

Chapter 2 therefore attempts to extend recent explorations on the ontology of money (Hodgson, 2000b; Ingham, 1998; Lawson, 2016; Peacock, 2017). Its contribution resides in providing sociological and ontological accounts for the emergence of novel (and emergent) economic knowledge that is fundamental in coordinating commercial societies and decentralized exchanges. Building on chapter 1, it provides novel insights that explain the important epistemic and ontological role money has in generating a system of social relations. Having such a distinctive role, money sustains the emergence of a *social type* of economic knowledge based on—but not contained within—the disseminated pieces of knowledge scattered throughout society. Thus, in a nutshell, part I focuses on complexity, emergence, the theory of money in more abstract and theoretical terms, and money's irreplaceable role in generating economic complexity.

It is known that money presents theoretical and analytical difficulties for neoclassical economics, which treats it as a cost-reducing tool and takes a socially neutral, aseptic view of it (Alchian, 1977; Gilbert, 2005; Hahn, 1965; Horwitz, 1992a, chapter 1; Ingham, 1998). Drawing from complexity theory, chapter 2 provides a socio-epistemic rationalization for money's irreplaceable role. Building on Ingham's (1996a) *Money Is a Social Relation,* I argue that money generates a new orderly system of complex social relations. This, in turn, engenders a type of social knowledge as an emergent and ontological phenomenon *irreducible* to the mere mobilization or aggregation of the fragmented knowledge that individuals held prior to the process of pecuniary exchange. Consequently, I contend that money *cannot* be separated from economic knowledge, macroeconomic complexity, or market rationality. Chapter 2 thus poses critical challenges to the traditional neoclassical and orthodox macroeconomic conceptions of money as a 'veil' over real exchanges (Alchian, 1977; Hahn, 1965; Schumpeter, 1934 [1912]) and of the fundamental, yet narrow, epistemic role of money as merely a 'knowledge conveyor' or simple 'knowledge mobilizer' (see Hayek, 1948 [1945]).

Nevertheless, most economists today recognize that the fundamental so-called 'coordination problem' that societies face in promoting a rational economic order stems from operationalizing and organizing the fragmented and tacit nature of a vast portion of the knowledge required for social coordination (Hayek, 1948 [1945], 1973). The coordination problem is fundamentally an informational, epistemic, and communicational problem at the societal level (Clower, 1984a, 1984b; Lavoie, 1985; Leijonhufvud, 1981; Paniagua, 2018c). In other words, it concerns how society can accurately create, mobilize, and operationalize hard-to-codify (tacit) knowledge that is indispensable for rational and efficient market decision-making, and allocations (Lavoie, 1985; Leijonhufvud, 1981). The coordination problem of markets' and society's economically rational allocation of resources has been considered by economists as the most fundamental challenge any social system needs to address to promote prosperity and to deal successfully with scarcity (Buchanan, 1964; Clower, 1984a; Howitt, 2012).[15]

For instance, Hayek (1948 [1945]) identified disequilibrium market prices as indispensable epistemic signals and mechanisms to alleviate the coordination problem and operationalize and distribute the knowledge available in society (Boettke, 1998b). Hayek added an emphasis on how prices and markets can allow us to communicate, mobilize, or operationalize existent fragmented contextual bits of

[15] On the tacit nature of some knowledge, see Polanyi (1958, 1966). A relevant part of our knowledge is nonlinguistically articulable and emerges from the practices, interactions, and communication of minds (Boland, 1979; Gigerenzer, 2008).

knowledge dispersed among minds (Hayek, 1948 [1945], 1979). Nevertheless, not much contemporary sociological and economic literature builds on Hayek, Simmel, and Weber to focus on two crucial epistemic and ontological issues and research gaps related to money and coordination. These two crucial research gaps are the following.

First, how market knowledge develops in society and can be said to actually exist in a communicable and comprehensible manner has been severely underexplored (Horwitz, 1992a). Further unexplored are the necessary *institutional (pre)conditions* under which unrelated and fragmented bits of economic knowledge can be first contextually formed and held in individuals' minds and later used, arranged, and operationalized by society in a complex and organized manner that subsequently obtains a wealth-enhancing higher-order (or emergent) type of social knowledge. Second, there is a gap in the economic literature in evaluating whether that crucial emergent economic knowledge, seen in markets, can be in principle ontologically reducible to, and explained directly by, the combination, mobilization, or simple aggregation of the individuals' previously unrelated and unorganized bits of knowledge—and therefore simply explained or replicated by knowledge aggregation and mere epistemic mobilization.

In other words, we need to question whether the emergent economic knowledge of markets can be reduced to, or merely explained directly by, the mobilization and aggregation of the scattered bits of unrelated tacit knowledge that originally constitute it. In this chapter, I address these research questions by providing a theoretical underpinning for the ontological and epistemic role of money in society and money's relationship with the emergence of economic knowledge. Put differently, this chapter seeks to borrow mostly from the insights developed in chapter 1 concerning organized complexity and social relations, but it seeks also to apply them particularly within the realm of monetary theory and monetary relations. Thus this chapter can be broadly considered as an application of the ideas previously developed in chapter 1, but within the realm of the use of money in society and its complexity-based and epistemic implications.

More specifically, here I address the aforementioned gaps in the literature by arguing first, in section 2.4, that market knowledge—similar to scientific knowledge—*is* a system of social monetary relations in context and is institutionally contextual and socio-relational. As such, market knowledge that is devoid of socio-relational processes and independent of the specific use of money and debt relations actually does not exist in an available (conveyable) form to be used or communicated (see also Buchanan, 1982). Rather, such economic knowledge is only generated in the context of the complex system of monetary relations sustained by money's dual role as the unit of account and as media of exchange (see section 2.2). Consequently, this chapter argues that without money there is neither economic knowledge, nor market rationality; thus money is also indivisible from macroeconomic coordination (Leijonhufvud, 1981). Second, in section 2.5, this chapter argues that money and exchanges play a crucial ontological and complexity-based role in socially *transforming* existent and scattered knowledge into higher degrees of emergent 'social intelligence'. Accordingly, I contend that money does not merely assist us to convey existent knowledge, but it also contributes to *orderly relating* such knowledge in order to produce emergent and novel irreducible totalities. This ultimately helps to explain money's ubiquitous non-neutrality and wealth-enhancing properties in commercial societies.

Furthermore, this important socio-epistemic role of money in moving beyond knowledge discovery and knowledge conveyance toward the *generation* of complex and emergent knowledge is a relevant argument that the socio-economic literature on money has not yet emphasized. Besides the contributions of Hayek, Simmel, and Weber, there have been very few explorations of the social and institutional preconditions necessary for complex knowledge and coordination to exist (Lewis and Wagner, 2017). Hence, the title of this chapter echoes Hayek's (1948 [1945]) celebrated paper on economic knowledge, but I seek to complement his rather narrow view on the socio-interactive aspects of knowledge (Polanyi, 1966) with a perspective on complexity and systems theory and the social ontology of money. This contribution concerning the irreducibility and emergent-complexity properties of economic knowledge and the use

of systems theory for understanding the positive consequences of monetary-social relations has profound implications for the socio-economic literature on money since it helps in understanding the ontological *non-neutrality* and unique underlying epistemic role of money.[16] Hence this chapter provides a distinctive socio-economic justification as to why money is indispensable and *always* non-neutral in the evolution and manifestation of all macroeconomic emergent outcomes.

The chapter proceeds as follows: Section 2.1 explores some relevant functional aspects of money. Particularly, it attempts to delineate what money is for the scope of this thesis by arguing that money is, and also generates, a system of social relations. The section also explores the roles of money both as the generally accepted means of exchange and as the unit of account. Section 2.2 examines some unique social features of money and the unexplored ontological properties that money generates. This section reviews and appraises the contemporary socio-economic literature on money, emphasizing its insights and also the most relevant research gaps present within that literature. Section 2.3 reviews the epistemic and cognitive role that institutions play. This section argues that institutions shape cognition and mind-to-mind relations, arguing also that institutions matter for producing a more complex 'social intelligence'. Section 2.4 analyzes further the relationship between institutions and the emergence of knowledge by focusing on Polanyi's (1951, 1966) sociology of scientific knowledge. The section thus provides parallels between how scientific knowledge is generated in science and how economic knowledge is generated in markets. Section 2.5 considers the relationship between money and economic knowledge as complex phenomena by suggesting that money creates an orderly system of exchange relations that engenders emergent irreducible totalities. Section 2.6 concludes.

2.1 Some Relevant Aspects of Money: From Epistemological Conveyance to Emergence

Hayek (1948 [1937], 1948 [1945]) considered the economic knowledge that is crucial to enhance social coordination as scattered, fragmented 'bits' and held (perhaps largely tacitly) in individuals' minds and embedded in the exercise of contextual skills. Thus prices are largely conceived basically as indispensable social tools to convey, communicate, and mobilize fragmented and tacit existent bits of knowledge, and also to provide them (the scattered knowledge) with a positive social use (Hayek, 1948 [1945]; see also Clower, 1984b and Thomsen, 1992). They could also be seen collectively as an '*extralinguistic* social conveyance mechanism' in which hard-to-articulate knowledge can be conveyed in exchange actions and mobilized across agents to be later reinterpreted (Horwitz, 1992a, 1992b).

This view—albeit a great contribution to unveiling the relational and communicational properties of money—by focusing merely on mobilization and conveyance of fragmented knowledge *already disseminated*, unintentionally de-emphasizes the unique social and ontological role of money and other institutions in the formation of novel 'higher order' knowledge stemming from a system of organized and complex relations; and it emphasizes instead the linear and simpler social outcomes stemming from mere processes of mobilizing and communicating something that is already there (Buchanan, 1982; Lavoie, 1985; Paniagua, 2018c; see also section 1.2 in chapter 1).

Hence the aforementioned literature overlooks the novel ontological properties and the qualitatively different economic knowledge generated from social interactions, focusing only on conveyance. It frames social relations—perhaps too narrowly and individualistically—as mere processes to mobilize and reinterpret pieces of existent knowledge among the separated agents, rather than interpreting social processes as mechanisms that generate novel organized complex phenomena. Thus it neglects the emergent and ontological properties that are not to be found in the mere communication, mobilization, or sum of knowledge held by individuals separately (or unrelatedly). Thus, in regard to economic

[16] Systems theory focuses on relationships between parts and wholes in which the system has relevant properties irreducible to and distinct from the properties held at the level of the parts that constitute the system (Bertalanffy, 1968). For details on their general properties and the list of features of complex orders, see chapter 1 and also Bertalanffy (1968), Lewis and Wagner (2017), and Hayek (2014 [1967]). For social ontology, see Ingham (1996b, 1998) and Lawson (1997, 2012, 2016).

knowledge, there is also an 'absence of anything resembling an adequate specification of its social structural conditions of existence' (Ingham, 1996a, 509). Conceptualizing prices merely as epistemic enablers or as conveyors of current and existent fragmented knowledge disregards the complex relationships between social structures and human agency and disregards also the emergent unforeseeable ontological properties that might arise from individuals' organized social interactions (Colander and Kupers, 2014).

By considering relevant economic knowledge in society as largely explicable by (or reducible to) the sum or interpretation and communication of the unstructured and unrelated fragmented epistemic bits held by individuals' prior exchanges, prices and money can be understood as merely related to processes of discovery, distribution, and 'extra-linguistic' mobilization of those scattered pieces of knowledge *already* disseminated (Hayek, 1948 [1945]; Horwitz, 1992b). Implicitly, this communication-interpretation view on money considers relevant economic knowledge to be on the same level of complexity and ontology as that of individuals' original and scattered knowledge (Lewis, 2016). Therefore, the socio-economic literature treats economic knowledge as easily reducible to the mere sum or aggregation of individuals' epistemic (informational), but disseminated, resources that constitute the market order (see for example Boland, 1979; Dyer, 1989; Notturno, 2014; Rabin, 2004).

This current view focuses on the signaling function of money, thus overlooking the possible system-organizing function that leads to ontological and relevant changes that could emerge in social knowledge (Lavoie, 1985). It also conceals the crucial complexity-based, or higher-order, role of money and markets in generating socio-dependent novel and more intricate forms of knowledge. It is argued here instead that such knowledge is actually emergent and *did not exist* prior to the system of social relations among individuals, established and sustained only through money (see also Buchanan, 1982). As discussed above, previous work concerning money, rationality, and knowledge has therefore severely discounted the ontological and complex epistemic role that money could potentially play in society through sustaining and enlarging orderly social relations.

The modern ontology of money instead suggests that money could potentially play an emergent economic role greater than (although containing) an extralinguistic communication process (Horwitz, 1992a; Ingham, 2000; Lawson, 2016) or a 'symbolic medium of social communication' (Ganssman, 1988, 5; see also Dodd, 1994). This chapter, building on Lawson (2012, 2016), Ingham (1996a, 2000), and Horwitz (1992b), argues that money's crucial role in the economy is an epistemological and ontological one that has not been totally explored in the literature. That role resides in money's ubiquity and unique capacity to generate and sustain a new and vast system of orderly social relations that (constantly) brings novel and ever-changing ontological and complex properties of market emergence—emergent properties that would have never existed without money as the medium of relation (and exchange). Money therefore engenders a socio-relational system that further sustains and arranges, in specific manners, the bits of local and disseminated knowledge, consequently having qualitatively distinct and ontologically diverse properties.

For the purposes of this work, money in modern capitalistic economies is considered as *socially constructed* and broadly represented by liabilities (complex systems of debt relations) in the form of bank currency (banknotes) as a generalized means of exchange, and as bank or demand deposits (bank-deposit liabilities) issued by commercial banks (Laidler, 1990; Smithin, 2000). In the words of Friedman and Schwartz (1982, 24), the total quantity of money available in circulation can be broadly defined as 'currency plus adjusted demand and time deposits held by the public'. Thus both types of bank liabilities together constitute money as a system of debt relations and as the generalized means of exchange in markets (see section 2.5.2). The sum of both banknotes (currency) held by the public and commercial bank or demand deposits then broadly represents *inside*-money as liabilities and as debt relations among agents and banks (Laidler, 1990; Selgin, 1988). Accordingly, the above definition of money as a system of debt relations relates closely to the concept of *inside* money balances; whereas *outside* money is only the ultimate means

of payment (settlement), which is usually established as a commodity money, like gold or silver (see also section 2.5.1). In general, outside (commodity) money as the ultimate means of payment (or settlement) does not circulate from hand to hand as the generalized means of exchange enhancing trade; instead, inside money (currency and demand deposits) does (Selgin, 1988; Smithin, 2000).

Moreover, banknotes, which in most societies today means central bank notes, are debt relations with respect to the state or the legitimately sanctioned monetary authority that issues notes as central bank liabilities. Banknotes are socially constructed debt categories in which the social relation acquires the form of the state's promise to pay (Ingham, 2000). This socially constructed debt category 'is constituted by social relations between the monetary [state-based authority] and other economic agencies in the society'. It is a type of 'state money' in which 'the liabilities of state central banks acquire the status of *valuata* money or base money' (Smithin, 2000, 7).

In addition, bank deposits, as commercial liabilities are money as debt relations produced by commercial banks and arise from bank credit. Bank deposits are generated through commercial banks' debt relationships (promises to pay) and nowadays ultimately constitute most of society's means of exchange. Therefore, the overall money supply primarily consists today of commercial bank deposits rather than banknotes, even though both represent money as debt relations in one form or another (Laidler, 1990, 33; Smithin, 2000). Hence modern capitalistic money 'now consists in nothing more than a symbol or signifier of states' and banks' promises to pay' (Ingham, 2000, 23). Accordingly, both bank deposits and banknotes are debt relations (conceived of as money), and thus both are extremely important in sustaining and enlarging the orderly system of monetary exchanges that generates the ontological transformation of knowledge as argued in the following sections.

Hence this work considers money as 'credit money, in which special signifiers of debt (promises to pay) issued by states and banks, become means of payment. . . capitalistic credit money is a qualitatively distinct form in which money-stuff itself is essentially the social relation of the promise to pay' (Ingham, 2000, 18–19). Thus money, in the form of modern capitalistic credit money—as Simmel (1978 [1907], 177) saw—is not simply a veil over economic and barter exchanges. Instead, it socially and qualitatively transforms pure (or barter) exchange relations into 'structurally distinct [monetary and debt] social relations' (Ingham, 2000, 23), which nowadays have a social triadic form (Smithin, 2000).

Money as a generally accepted means of exchange is not necessarily a single essential commodity that acquires special properties and is an end in itself, nor should it be longer consider a 'money-stuff' as commodity-objects (Ingham, 2000). Its essence as the means of exchange is 'most usefully seen as a socially constructed (and continuously re-negotiated) category, and is constituted by social relations between the monetary and other economic agencies in the society' (Smithin, 2000, 7). What makes money distinct from barter is not its physical properties or the nature of the 'money-stuff' itself, but rather the fact that it acquires a centrality in expressing exchanges and debt relations, enabling a widespread and homogenous system of monetary exchanges as triadic social relations (Yeager, 1968). In such system of relations, money '*necessarily* consists in [trilateral] *social relations* between economic agents and between them and a monetary "authority"' (Ingham, 2000, 19, emphasis in original).

Consequently, the focus here resides on the modern conception of money as capitalistic credit money, represented as a system of social and debt relations that creates systems of exchange that have a trilateral and homogenous social nature. The emphasis is on money's role as a means of exchange that establishes new intricate trade relations, generating a 'higher order' form of economic and social knowledge. However, we must not disregard the 'actual social processes by which money is produced . . . [and the fact] that money of account is the pivotal element of monetary practice [of exchange and debt relations]' (Ingham, 2000, 18). Indeed, not disregarding the actual social processes by which money is supplied to the economy fundamentally leads to a focus on the specific monetary-institutional contexts (the meta-rules) in which money is ultimately produced in the banking system. Such an institutional and

constitutional focus on money will be the main theme of the following four chapters.

Ultimately, money's centrality in the economic order stems from the fact that *virtually all* exchanges and trades in both organized and informal markets take place through monetary means of exchange, which include also debt (deferred payment denominated in money of account), itself a social relation (Clower, 1984a; Horwitz, 2000; Ingham, 2000; Yeager, 1968). Additionally, it is important to recognize that 'something which is merely being used as a convenient medium of exchange on the spot may approach to being money . . . [but] Money-Proper in the full sense of the term can only exist in relation to a Money-of-Account' (Keynes, 1930, 3; see also Smithin, 2000).[17]

Hence money as money of account, in addition to money as means of exchange, allows people to homogenously and consistently define debts and market prices and to express them also in a common numeric denominator; subsequently enabling numeric comparisons of alternatives and the different market values of goods, ultimately supporting also the process of rational economic calculation (Ganssman, 1988; Mises, 1981 [1922]; Weber, 1978). Additionally, it provides a commonly agreed denominator (focal point) by which to widely trade goods and to engage in more complex and general debt relations without the physical use of the 'money-stuff' (or commodity) to intermediate trades (Smithin, 2000; Keynes, 1930). Money of account (as unit of account) therefore means a standard-reckoning form of money (Heinsohn and Steiger, 2013).

In other words, money of account 'is the *essential* means by which price lists are constructed and multilateral, inter-temporal exchange is made possible. . . . [T]he actual money-stuff is not required for the immediate transactions' (Ingham, 2000, 18). This role helps to enable the general and ubiquitous use of money in multilateral inter-temporal and spot exchanges. Thus, as Clower recognized, 'Goods buy money, money buys goods—but goods do not buy goods in any organized market' (Clower, 1984b, 100). For these reasons, conventional base money (or *valuata*) and credit and debt relations—as means of exchange, sustained and enlarged also by the money of account—'touch' and intermediate *all* socio-economic exchanges and affect the form and extension of most socio-economic relations in markets.

Money, thenceforward, as means of exchange and money of account, acquires both a unique degree of social pervasiveness and a relevance for epistemic and intertemporal organizing of markets, which allows it to sustain a widespread system of orderly, recurrent, and commonly expressed (homogenous-in-kind) social interactions (Horwitz, 2000). Importantly, this unique system of relations that money engenders extends both market complexity and the formation of higher-order and social knowledge beyond what language, or any other form of human social relations, could actually achieve. The crucial aspect of both functions of money aforementioned is how they together allow money to express and order economic reality, to organize (homogenize) debt relations, and to bring people together into new and more complex social processes, unintendedly producing intricate and novel social configurations that are not designed (or expected) by the agents forming them (Horwitz, 1992a; Smithin, 2000).

This chapter then contributes to the existent socioeconomic literature on money, by moving beyond money's narrow role in the communication of existent knowledge (Horwitz, 1992a; Dyer, 1989), and by arguing instead that money is the unique social medium to relationally organized and *arranged* those disseminated bits of tacit knowledge, therefore providing a vital relational monetary context which generates (irreducible) emergent epistemic totalities in the form of social knowledge. Hence by borrowing from systems theory (see Bertalanffy, 1968; Lewis, 2016), this chapter also seeks to clarify and

[17] Horwitz (1992b) for example argues that throughout the evolution of monetary systems, the medium of exchange and unit of account have *coevolved* (see also Salter and Luther, 2014). Other scholars instead have argued that money's function as a medium of exchange derives from its function as a money of account (Smithin, 2000). It is beyond the scope of this work to contribute to that debate. I recognize *both* functions—independently of which one did in fact emerge first—as crucial to the epistemic and ontological role of money in sustaining complex systems of exchange and debt relations required to produce higher-order and social knowledge. See also the next section 2.1.1 in this chapter concerning some alternative views about money's origins and its functions.

expand further Clower's (1984a), Hayek's (1948 [1937], 1948 [1945]), and Horwitz's (1992a, 2000) views on economic knowledge, the epistemic role of money in exchanges, and the generation of information in society.

The chapter ultimately contends that the role of money *does not* reside merely in its capacity to communicate and signal existent information about local circumstances through prices (Thomsen, 1992). It also resides in money's unique capacity to provide an organizational structure or a new system of relations in which individuals can arrange and concatenate their knowledge and establish complex, but orderly, economic and mind–mind networks throughout its ubiquitous use. This serves not solely to mobilize and signal personal local knowledge, but to also assemble and socially configure knowledge in complex and novel manners that generate an organized system that obtains new ontological and coordinative properties never seen before in commercial societies (see also Lewis, 2016; Lewis and Lewin, 2015). But before diving into the core subject matter of this chapter (the epistemological role of money), the next subsection will briefly review some alternative views of money, so that the reader can have a general overview about the theoretical debates around money's origins and functions.

2.2 Some Alternative Views on Money: Does the Origin of Money Matters?

In regard to the evolution and origins of money, Horwitz (1992b) for example, following Menger, argues that throughout the evolution of monetary systems, the medium of exchange and the unit of account have *coevolved* (see also Salter and Luther, 2014). Other scholars instead have argued that money's function as a medium of exchange derives from its function as a money of account (Smithin, 2000). It is beyond the scope of this work to contribute to that broad debate concerning money's origins.[18] Thus, this work recognizes *both* functions—independently of which one did in fact emerge first—as crucial to the epistemic and ontological role of money in sustaining complex systems of exchange and debt relations required to produce higher-order and social knowledge. In any case, the main focus here is on money's role as a means of exchange (including debt relations), which might suggest a secondary role for the unit of account. However, here I also understand money, defined broadly as—and *developing* throughout as—the money of account used to denominate and coordinate exchanges in all markets and to express and denominate debt and prices (Keynes, 1930). Thus, the 'money of account is the pivotal element of monetary practice' (Ingham, 2000, 18).

That 'pivotal element' seems to be the starting point for the emergence of an orderly social structure of complex monetary practices based on the development of an asset that constitutes the medium of final settlement (unambiguously united with the unit of account in the same asset) (Smithin, 2000). From this, a multiplicity of generally accepted monetary media of exchange can arise, sustaining and enlarging the orderly exchange and social relations that produce the emergent knowledge stressed throughout this chapter. Such novel economic relations can rely on different forms of exchange media: the conventional base money (medium of final settlement) as means of exchange, and other debt relations denominated in money of account (settled by or related to the ultimate means of payment) (Smithin, 2000).

Hence, I recognize that money could potentially evolve from money of account, and it is then conceived in this chapter as a means of exchange sustained on, and enlarged from, money as the unit of account. Consequently, money is not a particular asset, but rather different forms of social and debt relations that individuals habitually use as means of exchange (Ingham, 1996a). Granted, generally accepted exchange media, in order to carry confidence and acceptability, are usually fixed (anchored) in terms of the unit of account (and related to the ultimate means of payment). Thus, money's crucial functions are interdependent (symbiotic) and not entirely separated (Menger, 1892). Accordingly, throughout this work, both functions are crucial and closely related in the formation of a broad and orderly exchange network of economic relations, and also a monetarily (in the sense of unit of account) expressed context for debts and prices that sustain monetary practices and rational calculation. Consequently, both functions are vital

[18] A complete and interesting overview around that debate can be found in Zelmanovitz (2015).

in enabling *different* aspects of the general epistemic functions of money that sustain complex market phenomena. Implicitly, the historical period assumed here is broadly the modern capitalistic economies that developed in the twentieth century and that rely on credit money and on vast credit-based monetary systems and debt relations as means of exchange.

Nevertheless, despite of the evolutionary view or ambivalent position on money taking in this work, there are several different perspectives concerning money's evolution, and consequently also, concerning governments' proper role in determining the medium of exchange. The "true" origins of money and its evolution are indeed hotly contested research questions in contemporary social science, particularly in anthropology, history and socioeconomics. Most of the debate around the "true origins" of money reside in the fact that scholars from different disciplines seek to ascribe normative and political conclusions from the origins of money. In other words, some scholars argue that if we can discover money's "true origins" and essence (its ontology), then we might be able to derive some normative conclusions concerning the use of money in society, deriving also political and institutional implications from such origins (Zelmanovitz, 2015).

For example, some scholars believe that if money's "true origins" reside in the state and its capacity to impose taxes, then, they claim, that is a sufficient basis to justify monetary arrangements in which the state is heavily involved in the supply of money. Thus, the alleged origins of money are used to eventually promote or justify normatively certain monetary institutions.[19] This is the reason why the debate over if money is a naturally evolved institutions, or if it is a creature of the state, is apparently relevant for any arguments for or against certain monetary institutions. I will shortly review this debate below and critically assess if we can actually derive normative conclusions from it.

In short, economists concern about money's role and evolution have developed broadly two alternative views. On the one hand, state theorists argue that government plays the most fundamental role in the emergence and continued acceptance of the commonly accepted media of exchange used in society. On the other hand, spontaneous order theorists (or catallactic theorists) argue that the evolution of money does not require the state involvement, maintaining that money ultimately emerges, and continues to be accepted, as a result of decentralized market and discovery processes. In what follows, I will briefly review both alternative views on money, so that the reader can be aware of the existence of other plausible arguments and theories around money's evolution and its fundamental roles.[20] This subsection concludes with some critical reflections concerning the actual relevance of the debate over money's "true" origins for monetary institutions, comparative analysis, and monetary theory.

The first mentioned tradition, the state theorists of money (also called the chartalists or chartalism), follow the tradition initially laid out by Georg Knapp (1924) and Abba Lerner (1947), in which they maintain that money is ultimately 'a Creature of the State' (Lerner, 1957, 312). The chartalists then argue that it is ultimately the unique coercive role of government the one that allows for the emergence and continued acceptance of money in society. The extreme argument within the chartalists is that money is always a creature of the state, thus deriving its pervasive acceptability from the legal tender status granted by government (also known as public receivability); moreover, the extreme end of the argument maintains also that, if money is essentially a 'creature of the state', then the state can choose virtually anything they

[19] It is important to recognize that these attempts to promote normative conclusions and political claims from money's alleged origins are valid for most of both chartalists or state theorists of money, and for catallactics or spontaneous order theorists of money. Interestingly, this *does not* apply to neoclassical economists concerned about money. Despite the fact that most neoclassical economists subscribe to some form of spontaneous order theory of money, they do not derive normative implications or political conclusions from money's alleged "true origin". In this sense, this entire work aligns with the ambivalent position taken by most neoclassical economists on this matter about money's origins: it is an interesting research topic, but we *cannot* derive normative, institutional, and political implications from such debate.

[20] Readers interested in a more thorough review on the two main theoretical positions concerning money's origins—the chartalist theory of money and the catallactic or Mengerian theory—should consult Zelmanovitz (2015) and Salter and Luther (2014).

wish to use as money and force it upon society. Alas, less extreme state theorists recognize that granting legal tender status to something and requiring that taxes should be paid in such a particular medium, might not be enough to ensure widespread acceptance in society.[21] Nevertheless most chartalists still maintain that *existing* monies are largely the product of government involvement.

According to the chartalist view, money is always a social phenomenon and thus, money is, in essence, a *debt relation* that cannot be understood without reference to the social and political institutions in which it is embedded (Ingham, 2000).[22] Usually chartalists use the historical record to show that money has in fact arose as a system of payments for the discharge of debt (Wray, 2004). Simply put, chartalists view money mainly as a balance sheet relation or a debt relation: to hold money is to finally hold and asset, which is a claim drawn on somebody else (Ingham, 2000). Even though chartalists tend to recognize also money's role as the medium of exchange, they tend to focus primarily on money's role as the unit of account and its properties as the store of value. In synthesis, the state theory of money claims that the government is the main actor in the determination of money and in defining the general medium of exchange by defining first the unit of account used to impose its citizens with taxes and general obligations. This view then emphasize the non-market sources of the origin of money. In other words,

> the state (or any other authority able to impose an obligation) imposes a liability in the form of a generalized, social unit of account—a money—used for measuring the obligation. This does not require the pre-existence of markets, and, indeed, almost certainly predates them. Once the authorities can levy such obligations, they can name what fulfills this obligation. They do this by denominating those things that can be delivered, in other words, by pricing them. (Wray, 2004, 7)

Thus, according to Wray's view, money has extra-market or non-market origins, through governments' capacities to impose obligations (taxes) upon citizens. This vision on money's origins was first fully developed by Knapp (1924), a student of the German Historical School, and now synthesized and carried forth mainly by Randall Wray's work (1998, 2004) among others. According to Knapp's theory, state-based money arises whenever the government specifies the specific object and the unit it will accept as a legitimate or legal payment or discharge for the obligations that are owed by its citizens (the taxes being imposed are defined in a single unit established by the sovereign). Finally, 'the circle is complete when the government begins issuing the "money-object" it legitimately accepts. Intuitively, the principle means by which the state imposes these obligations is taxation. Hence, the state can create a demand amongst the citizens for any money-object it accepts as payment for that purpose" (Salter and Luther, 2014, 164-165). In essence, and according to this view, money arises from extra-market means, mainly coercion; meaning the capacity of a string group to impose tributes and taxes upon weak groups.

When that debt relation is established throughout the use of coercion and the threat of violence, some goods that are legally used to the discharge of those debt relations and taxes, will become an economic "focal point"; acquiring a strong demand from the general population, since now they can be used generally to discharge thus involuntary liability. The general population thus generates a new set of market expectations around those state-defined goods, since the members of the tax-paying group know that they need those specific goods in order to legally discharge their debt relations in the future, and consequently they will be willing to rescind from barter exchanges, and to start accepting only those *state-defined* goods in market exchanges today. Hence, according to this chartalist view, it is ultimately the state and its capacity to impose coercion the *focal point* upon which money emerges, causing some specific state-

[21] This point was first raised by Max Weber (1947) when he criticized the extreme version of the chartalist theory of money. Indeed, Weber criticized Knapp's state theory of money, arguing that state power or coercion alone might not be enough to constitute and sustain money as an economic practice; a system of paper money without a metallic standard would have "only a relative degree of formal rationality" (ibid., 308). For this reason, Weber advocated for a metallic standard, based on *customary and emergent practices*, to supplement rather than replace the "legitimate authority of the state" (ibid., 308).

[22] The concepts of "chartalism" and "chartalists" derive from the Latin word "charta", meaning a "ticket" or a "token".

defined goods to eventually become the general medium of exchange.

Recently, and linked to current developments on chartalism also, there are some new and hotly debated alternative views on money being put forth by what is being known as Modern Monetary Theory (MMT).[23] In this way, chartalism or the state theory of money is being carried forward in economics by MMT, which seeks to synthesize both Knapp's ideas concerning the state-led origins of money, and the ideas of Alfred Mitchell-Innes on the credit theory of money. In short, MMT seeks to describe money as a public monopoly and unemployment as a consequence of a currency monopolist overly restricting the supply of the legally accepted asset needed to pay taxes (Tymoigne and Wray, 2013).[24] Most notably perhaps, the major contribution of economists working around the MMT vision of money, is that they have tried to fully fleshed-out the unusual—and rather questionable—policy implications that follow from the chartalist vision of money (Kelton, 2020). In the words of Stephanie Bell (now Stephanie Kelton):

> The Chartalist theory provides not only a better theoretical foundation (one grounded in historical facts) for monetary theory … Additionally, some important policy implications follow from the Chartalist theory. First, an understanding of the Chartalist theory of money leads to a fundamentally different vision of government finance. Specifically, … the role of fiscal policy is much more important for the determination of the money supply than is usually recognised. This is, of course, antithetical to mainstream theory, which attributes control of the money supply to monetary, rather than fiscal policy. Secondly, the lender-of-last-resort role of the state must be extended beyond simply the ultimate supplier of liquidity in times of crisis to include its ongoing hierarchical role based on the public's need to pay taxes. Both of these, of course, strengthen the endogenous money position. (Bell, 2001, 162)

MMT has been severely criticized by several mainstream economists for lacking a coherent theoretical and monetary framework (Bisin, 2020; Coats, 2019; Chicago Booth 2019; Hummel, 2019; Palley, 2015; Sumner and Horan, 2019). Also, it has been criticized for its unusual policy implications; particularly for two ideas: first, the idea that government deficits don't really matter much in themselves for countries like the United States (that borrow in their own currency issued by the same state), whilst MMT does not really reveal more scope for deficit spending *without* generating harmful amounts of inflation (Coats, 2019; Hummel, 2019; Sumner and Horan, 2019). Second, its proposal to use taxation as an instrument to engage in monetary policy, disregards all the well-known public choice and political problems around conflating or blending the fiscal part of the state (fiscal tax authorities) with the monetary institutions in charge of issuing money (central banks); neglecting of course centuries of historical evidence showing that this is indeed a very bad idea (Bisin, 2010; Sumner and Horan, 2019).

Indeed, a 2019 survey of leading economists in the United States showed a unanimous rejection of MMT's most controversial claims concerning: (1) "Countries that borrow in their own currency should not worry about government deficits because they can always create money to finance their debt"; and (2) "Countries that borrow in their own currency can finance as much real government spending as they want by creating money" (Chicago Booth 2019). In some fundamental sense, MMT uses the chartalist view concerning the state-guided and tax-based origins of money to develop policy prescriptions and a

[23] Readers interested in the general and most recent arguments being put forth by some key authors around the Modern Monetary Theory vision on money should consult Kelton (2020) and Mitchell, Wray and Watts (2019). For a brief critique on MMT consult also Bisin (2020), Coats (2019), and Palley (2015).

[24] The initiators of MMT have defined their own monetary vision as: 'an alternative approach to monetary theory that integrates the insights of Knapp's (1924) state money approach (also called chartalist and adopted by Keynes (1930, 1914)), the credit money view of Innes (1913, 1914), Lerner's (1943, 1947) functional finance approach, Minsky's (1986) views of banking, and Godley's (1996) sectoral balance approach. In addition, most of us have used our understanding of the operation of the monetary system to propose an employer of last resort or job guarantee program to provide an anchor to the value of the currency. The approach has come to be known as modern money theory (MMT)' (Fullwiler, Bell, Wray, 2012).

normative view on monetary matters, based on the preeminence of state power and imposed financial coercion in order to achieve certain political ends, whilst disregarding the institutional dangers and social costs associated with such policies. Due to both length constraints and the focus of this work, I will not develop further a critical review on MMT here; it suffices for now to highlight Bisin's comments:

> it is the core of MMT that appears as merely a rhetorical exercise. As such it is interesting, but not a theory in any meaningful sense I can make of the word. The T in MMT is more like a collection of interrelated statements floating in fluid arguments. Never is its logical structure expressed in a direct, clear way, from head to toe. It is very hard for the reader to capture all the moving parts in a coherent structure, which would allow for some sort of confutation. (Bisin, 2020, 3)[25]

Now concerning the second mentioned tradition, the spontaneous order theory of money (or the Mengerian theory of money) argues that money as an institution is largely an emergent and unintended product of decentralized exchange and barter processes (Menger, 1892). Money then is created as an institution without design; meaning that is an emergent process arising from barter exchanges in which individuals are merely seeking to maximize their own welfare, yet—without intending it—those welfare-maximizing exchanges produce unintendedly the origin of money, which benefits the whole society (Horwitz, 1992a). Indeed, today most economists subscribe to a broadly Mengerian and spontaneous order theory of money (Alchian, 1977; Dodd, 1994; Duffy and Ochs, 1999; Horwitz, 1992a; Kiyotaki and Wright, 1989; Kocherlakota, 1998; Rabin, 2004; Selgin, 2017). Thus, for most economists today at least money is the unintended social outcome of individual actions in decentralized market.

Under a barter system, there is the general challenge of the mutual coincidence of wants; meaning that if I want to barter or trade, let's say, a sheep for olive oil, I have to first invest in time and effort of finding an olive oil producer *interested* in my product and willing to exchange his olive oil for my sheep, otherwise the trade cannot be made. For barter to become efficient and to satisfice the needs of trade, traders must be able to deal with the double coincidence of wants in an expedient and effortless manner; otherwise barter becomes a challenge for traders impeding exchanges. The challenge of the double coincidence of wants (the coincidence that the seller will actually want the product of the buyer and *vice versa*) therefore is a big transaction cost that affects barter exchanges (Menger, 1892). In the absence of a mutual coincidence of wants, a rational economic actor will find convenient to look at the situation around him and start trading his goods for the *most saleable* object being used by other merchants. Doing so will improve his odds of finding a trading partner that will actually want such most saleable object, helping him to trade more easily and overcome the challenge of the double coincidence of wants.

Unintendedly however, by using that good or commodity, that is being considered as the most saleable object among merchants, the subsequent decentralized actions of individuals will further enhance the saleability of that original object that was commonly being used, thereby encouraging others to accept it as well. The end social result, according to Menger, is a process of narrowing down to a stable set of a few highly saleable objects that one might finally denominate money. Thus, for Menger and for Adam Smith also, the origin of money can be traced back to a form of 'spontaneous order' which arises from both exchanges and the economic agents' decentralized attempts to overcome the challenges posed by the mutual coincidence of wants.[26] Finally, Menger also briefly considers the actual role of the state in

[25] See also Coats (2019, 564) critical remarks: 'MMT is an unsuccessful and empty attempt to convince us that we can finance the Green New Deal and a federal job guarantee program painlessly by printing money. But it remains true that shifting our limited resources from the private to the public sector should be judged by whether society is made better off by such shifts. Printing money does not produce free lunches.' Ultimately, it seems then that '[b]oth the excitement and motivation for MMT seem to reflect the desire to promote a political agenda, without the hard analysis of its pros and cons — its costs and benefits' (ibid., 575).

[26] See for example Adam Smith's remarks concerning the origins of money in Chapter IV of *The Wealth of Nations*; "Of The Origin And Use Of Money": 'in order to avoid the inconveniency of such situations [the double coincidence of wants], every prudent man in every period of society, after the first establishment of the division of labour, must naturally have endeavoured

monetary acceptance: 'Money has not been generated by law. In its origin it is a social, and not a state-institution. Sanction by the authority of the state is a notion alien to it' (Menger, 1892, 255). It is relevant to recognize also that Menger saw the role of the state as irrelevant, or unnecessary (the intervention of the state was not a necessary condition), only in regard to the *emergence* of money alone and nothing else; thus, he explicitly recognized the positive role of the state in the guidance and manage of money, after it has emerged. Menger then acknowledged the positive role of the state after the emergence of money, particularly in adapting and improving the spontaneously emerged money to the needs of formal commerce, by providing for the minting of coins of reliable weight and purity, and convenient denominations.[27]

Nevertheless, for the spontaneous order theorists, money arises unintendedly and without necessarily the intervention of the state, from the mere fact that certain goods become the general media of exchange whenever they are widely accepted in society (after they become the most saleable commodity). According to this second vision then, money is a paradigmatic example of the "invisible hand" at work, in which a social institution is generated, not by coercion, but by the myriad of narrow profit seeking actions of individuals in markets; nevertheless, this new institution makes everyone better off, despite the fact that nobody intended it or designed it as such (Horwitz, 1992a).

Now these two aforementioned visions concerning money's origins—the chartalist and the spontaneous order vision—might seem to suggest two entirely different visions concerning how the monetary order can be sustained and generated.[28] From the Mengerian vision of money one could derive a more pro-liberty and a spontaneous worldview, whereas from the chartalist vision, a more centralist and pro-government vision of the monetary order is suggested. If the Mengerian theory of the origin of money is correct, then money is a product of markets and freedom to trade, money then becomes an outcome of freedom and collaboration, suggesting a normative pro-liberty vision about how money should be managed and produced. On the other hand, if the chartalist theory of money is correct, then money is a product of coercion and of state intervention, suggesting that the state has a huge role to play in sustaining a monetary order. The normative implication stemming from the chartalist theory of money, is that the government and the power of coercion are fundamental aspects in generating a coherent and sound monetary order.

Clearly these two theories concerning the "true origin" of money seem to suggest two entirely different worldviews, suggesting also entirely different normative and institutional conclusions about how money should be managed. Nevertheless, 'small concessions by authors on both sides of the debate leave room for a unified theory that emphasizes the spontaneous order aspects of money without trivializing the role of government' (Salter and Luther, 2014, 163). Indeed, these two apparently opposite theories about money's origins can be reconciled and made compatible.

For instance, is perfectly plausible that earlier forms of money might have been generated spontaneously from individual exchanges, allowing a certain set of goods to become the general media of exchange; and, subsequently, governments and monarchs recognizing this emergent process, might have later authorized the payment of taxes and made exclusively legal the use of only one particular good from

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to manage his affairs in such a manner, as to have at all times by him, besides the peculiar produce of his own industry, a certain quantity of some *one commodity* or other, such as he imagined *few people would be likely to refuse* in exchange for the produce of their industry' (Smith, 1981 [1776], 37-38, emphasis added).

[27] This does not suggest that the state or governments are the only institutions able to provide reliable minting and coining services. Indeed, historical evidence has shown that private associations and civil society have been perfectly able to provide those monetary services spontaneously and reliably, whenever the state fails in those monetary duties (Selgin, 2011).

[28] This division of views and apparent dichotomy concerning money's origins (markets vs states), can actually be reconcile and made compatible theoretically, by synthesizing both state and spontaneous order theories of money (Salter and Luther, 2014). Indeed, Salter and Luther (2014) 'provide a generalized theory of the emergence and perpetuation of money informed by both state and spontaneous order theories and consistent with recent theoretical and empirical advances in the literature' (ibid., 161).

those saleable assets that arose spontaneously. Hence the state, by stamping a legal "seal" linked to one commodity, might greatly contribute to increase its market desirability as an instrument for enabling indirect exchanges (Zelmanovitz, 2015).[29] In other words,

> If the Chartalists concede that the first forms of medium of exchange, those that had evolved spontaneously in society, happened before the introduction of coined money; and if the Catallactics accept that money has been provided by the state since the introduction of coined money, the two accounts would suddenly become compatible. The two versions may be interpreted simply as partial accounts, one until the introduction of coined money, and the other afterwards. Making these two versions compatible seems easy and it actually is. (Zelmanovitz, 2015, 11-12)

As argued above, it is perfectly plausible that the state might have used its coercive power, through taxation, to augment the demand for a specific commodity, greatly affecting the emergence of money and converging the process into a single object.[30] Thus, it is perfectly plausible to acknowledge both the role of the state in the emergence of coined money, provided also that we recognize that the state intervenes *constrained* by a historical and cultural milieu and a path dependence process which arises spontaneously within society and without necessarily state intervention. In other words, it is perfectly plausible to reconcile the endogenous and spontaneous social processes that allow money to arise, with a more moderate chartalist approach, to finally arrive at a more general theory of money with more explanatory power (Salter and Luther, 2014). The main conclusion we can derive from this synthesis, which echoes Max Weber's (1947) original critique on Knapp's state theory of money, is that 'the state (or other elites) can contribute to the demand for holding a commodity for exchange purposes, but they cannot bypass the emergence process and declare a monetary order *ex nihilo*' (Salter and Luther, 2014, 172).[31]

To conclude this debate, we can recognize that, 'both views—that which presumes the government acts on the market as wells as that which presumes the market is unaffected by government action—are inadequate' (ibid., 173). In other words, and according to this new moderate (non-normative) and more compromising synthesis between the state and spontaneous order theories of money, it is *not* the case that the state can always and everywhere determine *ex nihilo* the commonly accepted medium of exchange; whilst it is *not* the case either that governments are altogether impotent in their capacity to influence the emergence of money (ibid., 175). Consequently, 'the state may influence, for instance, by accepting the money it produces as an instrument to pay taxes and then creating a "utility" even for pieces of painted paper, but it cannot determine the subjective value which the agents will perceive in this "utility"' (Zelmanovitz, 2015, 40).

Governments, therefore, under some specific contexts and population sizes (i.e., a government of sufficient size relative to the number and size of agents in the system) can affect and indeed potentially improve upon some monies which have emerged naturally (i.e., in the absence of government) (Li and Wright, 1998; Duffy and Ochs, 1999). Duffy's (2001) work suggests that governments can help to solve

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[29] In fact, it is perfectly reasonable to assume that governments might have preferred to build upon or piggyback from an *already existent* and ongoing social process in which some media of exchange was already developing from social customs; political-risk-wise this might have been actually the most reasonable thing to do, since 'it was in the interest of the political authorities to select as the unit of account they will impose on society one that would have the *least resistance possible*, probably one that had already been in use, and at a certain ratio not much different than the one practiced in the daily transactions of their subjects' (Zelmanovitz, 2015, 34-35, emphasis added).

[30] In fact, this point has been recognized by most spontaneous order theorists at least since Adam Smith remarks on the matter: 'A prince, who should enact that a certain proportion of his taxes should be paid in a paper money of a certain kind, might thereby give a certain value to this paper money; even though the term of its final discharge and redemption should depend altogether on the will of the prince' (Smith, 1981 [1776], 328).

[31] Similar results and conclusions can be found in formal search-theoretic models; for more details consult: Li and Wright (1998) and Aiyagari and Wallace (1997).

the multiple-equilibrium difficulty associated with the emergence of money, thus improving welfare by anchoring the beliefs of the agents in the economy, finally enabling the achievement of a challenging monetary equilibria upon a single focal point (i.e., helping to establish a better form of money). Undeniably, 'as a matter of historical record, since money became coined money, almost always, almost everywhere, money production has been monopolized by the state; and, as previously mentioned, that seems to be supported by historical evidence. However, that does not imply that the purpose of money in society is given by the state, or that money should be subordinated to the political goals of the rulers' (Zelmanovitz, 2015, 47).

Similarly, under other certain social conditions—meaning, 'every time the social conditions for indirect exchanges present themselves, a medium of exchange gradually gains acceptance [without the need for state intervention] because such behavior is ingrained in human nature, because individuals have the rational faculties to time and again perceive the utility that may be derived from the use of such an instrument' (ibid, 2015, 74).[32] Nevertheless, one thing is certain from recognizing the partial validity and truth of both visions around money explored:

> The fact that the government enforces the currency is no more proof that the money is a State creature than the definition of a standard grammar by some state-sponsored agency to be adopted by the schools in the country is proof that the language was created by the State, or the enforcement of corporate law is proof that corporations are creatures of the State, or that enforcing civil law in the courts is proof that marriage itself is a creation of the State. (Zelmanovitz, 2015, 29)

Finally, we have to ask ourselves a crucial question: does the origin of money matters for monetary institutional analysis? As it turns out, seeking to discover the "one true theory" of money's origins—even if such a discovery could ever be achieved—it doesn't matter much for the more relevant debate concerning which monetary institutions are relatively more robust; and consequently, which institutions should be in place in order to manage and produce money correctly. Hence this whole historical debate, concerning money's origins, does not matter much for both monetary institutional analysis and for monetary policy. This is actually evident once we recognize that understanding the origins of something *does not* necessary imply either that things must remain as they originally were, or that you could derive normative and institutional implications out of the historical development of something. Otherwise, this could be considered as a "leap of logic", since you cannot derive institutional conclusions and normative implications from the mere fact that, historically, money has evolved in a certain manner.

It is relevant here to recognize, as Zelmanovitz (2015) points out, that trying to locate the essence and crucial properties of money in the particulars of its historical origins is an example of a logical fallacy denominated the "genetic fallacy".[33] Understanding the origin of something does not necessarily imply understanding or being able to explain its essence. Thus, 'the origin of a thing does not necessarily explain

[32] In fact, there is nothing in both the historical account of the origin of chartal money, or in the chartalist claim that a unit of account was first established by the state, that actually negates or disproves the other relevant claim that, once certain social conditions are established, individuals will use indirect exchanges (money) to acquire the goods they desire. Indeed, Klein and Selgin (2000) have provided valuable experimental evidence through simulating in a laboratory the consistency of Menger's spontaneous account of the origin of money. From that experimental evidence, they concluded that: 'Money can emerge spontaneously even where traders have only a very dim perception of the marketability of distinct goods, based on very limited random sampling, and even where all goods are equally marketable at the onset of the evolutionary process' (Klein and Selgin, 2000, 232).

[33] Concerning the notion of the "genetic fallacy", and according to Den Uyl and Rasmussen (2005), the naturalistic fallacy is "the alleged fallacy of deducing a statement of what ought to be from a statement of what is the case, or a statement about a value from a statement about a fact" (ibid.,112). An example of the genetic fallacy would be the following: if we can trace the origins of human mobility to the fact that humans can use their legs and hence mobility has arisen from the existence of legs, then all forms of mobility ought to be exercised only through walking; thus, electric trains and submarines ought to be found spurious forms of mobilizing since they go against the origins of mobility. A similar problem can be found in the normative and institutional conclusions of the chartalists concerning money's origins.

the essence of that thing is easy to accept' (ibid., 46). This suggests that even if money was indeed historically the result of state coercion, there could still be plausible efficiency and public choice arguments for monetary decentralization and freedom today. Likewise, as we have seen above, even if money was historically the result of spontaneous forces and freedom of exchange, there could still be plausible arguments for monetary control by government or central banks today.

In other words, recognizing the obvious historical facts—pointed out by the chartalists—that coined money has indeed arisen, almost always, and everywhere, as a product of state coercion and the monopolization of its coinage by the state, that, alone, 'does not imply that the purpose of money in society is given by the state, or that money should [always] be subordinated to the political goals of the rulers' (ibid., 47). Although it is possible that money arose through government intervention or state coercion, this does not suffice to claim that the efficient way to manage and produce money today is by state monopolization. Pointing out the alleged origin of money *does not* provide enough ground to claim that this is the best available institution to manage money or produce a sound monetary order. It is one thing to say that the origins of money have been incredibly influenced by the state and that state coercion has indeed altered the emergence of money, but from that premise it is not possible to claim that the state must monopolize money and always be in charge of producing a monetary order. This is simply falling into the fallacy of *non sequitur*.[34] As Zelmanovitz acknowledges:

> as a matter of historical record, since money became coined money, almost always, almost everywhere, money production has been monopolized by the state; and, as previously mentioned, that seems to be supported by historical evidence. However, that does not imply that the purpose of money in society is given by the state … one can … still recognize that coined money has been provided directly or indirectly by the state since it was introduced twenty-five centuries ago. A completely different thing is to say that money must be provided by the state or that the state is following the most beneficial course of action for society in keeping its monopoly on money production through legal tender. … The fact that money has been monopolized by the state does not imply that it is the right thing to do or that it must continue to be that way. (Zelmanovitz, 2015, 47)

To conclude this section, I have argued that ultimately it is not a valuable debate to quarrel over organic (spontaneously grown) institutions and pragmatic (consciously design) institutions; since they are good and bad institutions which are spontaneously grown, as well as good and bad institutions that are consciously design. You can find spontaneously grown institutions, that arise from exercising freedom and exchange, yet they might still be efficiency, institutional and moral arguments showing that those "natural" institutions need to be corrected or amended by the state (Schelling, 1971); similarly, you can also find institutions that arise from or are generated mostly by state coercion, yet they might still be efficiency and institutional arguments showing that they might be other non-governmental forms for better managing those institutions (Ostrom, 1990). Ultimately, the historical origins of certain institutions do not matter much for arguments concerning political economy, institutional robustness, governance, and comparative institutional efficiency.

Thus, from an institutional and robustness perspective, it seems that it is more relevant to move away from "organic" versus "state" historical debates, and rather focus our attention on the essential epistemic role of money in society and the institutional character of money (i.e., the likely institutional structures required to govern money's production); and therefore, to eventually focus on a comparative analysis of its surrounding and relevant institutions, rather than quarreling ceaselessly over money's plausible origins. To summarize the arguments above, determining the "one" and "true" origins of money:

[34] According to the Encyclopedia Britannica: 'The fallacy of non sequitur ("it does not follow") occurs when there is not even a deceptively plausible appearance of valid reasoning, because there is an obvious lack of connection between the given premises and the conclusion drawn from them' (Rescher and Schagrin, 2020).

> both in general and in particular historical contexts, is a valuable project. But whatever knowledge arises out of this project, it is unlikely to matter much for the structure and conduct of existing monetary institutions. Arguments for (or against) monetary freedom stand or fall for reasons unrelated to money's origins. Let's not confuse questions of history for questions of comparative institutional analysis. (Salter, 2017b, 1)

2.3 Social Features of Money and Unexplored Ontological Properties

As suggested previously, the ontology of money and the application of systems theory, which considers the emergence of new and complex economic phenomena, or wholes, through orderly social interactions, suggest that money could play an economic and complexity-based role far greater than (although containing) a communication process or a 'symbolic medium of social communication' (Ganssman, 1988, 5). Neoclassical economics, however, cannot grasp this complexity-based and ontological relevance of money because it cannot adequately conceptualize social structures, social relations, and the emergent properties generated from them (Ingham, 1996b; see also chapter 1). Economics has been alas too narrowly focused on money as an individualistic efficiency tool and a cost-reducing device that atomistic utility-maximizing agents use (Alchian, 1977; Smithin, 2000). Hence economists have disregarded the social, constitutional, and institutional context and the networks of interactions that agents form through using money, proscribing any considerations concerning social relations.

On the other hand, in the sociological literature on money there have been several other non-ontological and non-emergent social, power, and cultural properties of money highlighted that might seem prima facie relevant for the attempts of this chapter to show money's unique socio-epistemic relevance. Some of the current non-economic (or indirectly economic) aspects concerning money and sociology treated in the literature are social and cultural issues concerning sharing and constructing symbolic relations and commercial meaning and codes about the world, money's emergence as a denominator and signal of financial wealth and its tensions, money's role in defining and signaling social power and thus generating power issues (struggles) within markets, and money's communicational and semiotic aspects (Dodd, 1994; Dyer, 1989; Heinsohn and Steiger, 2013).

Nevertheless, despite the socioeconomic literature's relevance on some social and cultural issues, this chapter does not focus directly on these aspects since they do not address explicitly the ontology of money. Particularly, they do not address the vital relationship between specific institutional contexts, the formation of social relations, and the novel emergent market phenomena that might arise from them.[35] Thus they leave unexplored the ontology and epistemology of money and markets, the higher-order coordinative implications of systems of social relations associated with money, and how those monetary

[35] Heinsohn and Steiger (2013) suggest that money plays a crucial role as a denominator of wealth and thus social power. Indeed, there are some social aspects of money aforementioned that are related to additional epistemic and social-signaling functions that actually contribute to the emergence of economic knowledge—particularly, the role of money as an epistemic aid in enabling the measuring of private wealth (and debt contracts) and thus the ascertaining and comparing of economic value. This helps promote intertemporal economic calculation and a rapid expansion of rational debt relations. Money plays a role in measuring wealth and debt, and thus it enables individuals to plan through time their actions and debt relations. Through money, individuals can rationally manage and compare wealth, debts, and economic actions by comparing the economic value of alternative means and rationally use debt or their resources (wealth) to obtain their ends. In addition, there are potential power issues within markets that are associated with the production of money and private property and that might arise as consequences from the use (and production) of money and dispersed ownership (Ingham, 2000). Private property is also intimately linked first with decentralized trade and the capacity to exchange property and enact contracts, then with the emergence of money (and debt) (Heinsohn and Steiger, 2013). However, this could also be associated with the existence of power issues (struggles) *within* those same emergent totalities. Indeed, power issues and the form taken by wealth and social powers in markets might be intimately related to the use and production of money to establish social relations and then closely tied to money's epistemic role. The emergence of money and that of prices are themselves social processes in which politics and power struggles today play a key indivisible role (Salter and Luther, 2014; Weber, 1978). Hence money is 'a system of social relations based on power relations and social norms' (Ingham, 2000, 19). Power issues and tensions are relevant in constantly shaping and affecting the social relations that generate and constitute money and its production, therefore having a large impact in coordination and the emergence of economic knowledge (Wagner, 2010).

associations can actually generate new complex knowledge in the economic process (Lawson, 2012). Moreover, such aforementioned cultural, power, and efficiency aspects, by not specifically focusing on the process of exchange and the system of market relations enlarged by money, are also not concerned with how the use of money could ameliorate the coordination problem (Yeager, 1968).

Thus the aforementioned aspects of money are silent on epistemic issues such as how money organizes and arranges bits of knowledge in manners that reach irreducible emergent totalities. Hence they are considered ancillary to this chapter's scope since they do not address the complexity-based relationships between the ubiquitous use of money in exchanges and the formation of orderly relations. Building on chapter 1, this chapter instead sheds light on the underdeveloped epistemology and complexity of money (Ingham, 1998), thereby building a bridge between social theory and complexity theory.

Building upon Ingham's (1996a) *Money Is a Social Relation*, I argue that money generates a new and orderly system of complex social relations, making orderly interactive processes possible. Those relational and orderly processes engender a higher-order type of knowledge as a social phenomenon that has unique and novel properties that are beneficial to society yet were nonexistent before the widespread system of monetary relations. Thus, I contend that money uniquely engenders economic knowledge as emergent and irreducible phenomena. This emergentist perspective differs also from the aforementioned narrow utility-maximizing and transaction-costs justifications for the use of money seen in neoclassical economics (Alchian, 1977; Clower, 1984a, 1984b; Smithin, 2003). Money's economic uniqueness, I argue, stems from its role in organizing complexity and thus in allowing a more highly organized epistemic phenomenon to arise from social relations helping to promote higher degrees of market rationality and in obtaining novel epistemological outcomes that are not contained in the parts that constitute the relational order (Hayek, 2014 [1964], 263).

On the other hand, the recent sociological literature on money, building on Ingham, has focused on the 'social production' of money and how money is conceptualized as a 'system of social (and debt) relations' (Ingham 1996a; 1998; Lawson, 2016). However, there has been little attention to the ontological and epistemic implications or the emergent economic effects that such a system of social relations could generate (Lawson, 206; Lewis, 2016). Scholars have recognized that money's existence poses severe problems for neoclassical economics, yet little effort has been conducted in economics towards addressing such challenges (Horwitz, 1992b; Ingham, 1996a; Lawson, 2016).

In the following sections I contend that there is no other institution (or meta-rule) as important for the formation of economic knowledge as money. Money is ontologically *never* neutral in society, since it plays a unique social role in producing novel epistemic complexity, thereby giving economic transactions a new nature beyond barter, and generating novel social relations (see also sections 1.2 and 1.4 in chapter 1). Its social *non-neutrality* resides in allowing intricate and irreducible social knowledge to emerge from social relations. Consequently, money cannot be considered neutral since it creates new epistemic and ontological properties in society not contained within individual minds. Thus money is the sole institutional context in which economic knowledge and coordination ultimately exist, and enhances 'social intelligence'.[36] Hence economic knowledge itself is a system of social relations.

2.4 Institutions and the Broadening of the 'Social Mind'

In exploring the specific connection between money and knowledge is also necessary to articulate the

[36] There are two levels of intelligence: one at the individual level, and the other at the social level. Individual intelligence depends mainly on personal cognitive capacities. Instead, the 'social intelligence' or 'interacting intelligence' of the whole system can be greater or less than the sum of the system's individual parts (Lavoie, 1985). It relates less to the individuals' capacities in isolation and more to the social and communicational properties that arise from their specific methods of interaction. Social intelligence is an emergent property not entirely located in, nor reducible to, the aggregation or sum of individuals' minds or consciousness (Lavoie, 1985; Marx, 1973 [1939]; Paniagua, 2018c).

general relationship between institutions and individuals' contextual cognition, and to articulate the ontological implications of institutions in human relations (Lawson, 1997). In other words, it is important to explore how (if at all) institutions affect how knowledge is generated and eventually disseminated at both the individual and social levels (North, 1994; Rizzello, 1999). Relating the concepts of knowledge, individuals' relations, and institutional contexts provides a view in which 'institutions lose their purely functional nature outside of the individual and become the expression of the capabilities of the mind, which are not innate but develop and are organized in connection with other individuals' (Rizzello and Turvani, 2000, 177).[37]

Moreover, the literature on contextual cognition and the growth of knowledge provides further support for considering institutions and their rules—which govern social interactions—to have deep repercussions for the epistemic resources they generate (Boland, 1979; Gigerenzer, 2008). It is important to note that institutions not only provide the limitations and rules for guiding action, but also provide the mechanisms and *means* of social interaction and the social frameworks in which experiences are shaped and cognition will ultimately operate. Through specifying the norms and means of interaction, and the form of social relations, institutions could have a large effect on the knowledge individuals produce through mind–mind relationships (Polanyi, 1958; Rizzello, 1999).

Institutions are commonly defined as the formal and informal rules that govern and guide human behavior (North, 1994; Ostrom, 2005). Hence they are usually depicted mainly as affecting actions and determining the limits and incentives for rational choice. However, they can be also conceived as doing something much more relevant than imposing restrictions on decision-makers (Boland, 1979). We need to move beyond the functionalist view of institutions, in which they simply improve individuals' utility, lower transaction costs, or bind the individuals. Agents are not only guided and bound by institutions in regard to their autonomy and plausible sets of actions. What their minds express, how their choices unfold, and how they think are largely influenced by the context of their experiences, the rules that define cognition, and their social settings (Hodgson, 2004; Rizzello, 1999).

Our cognitive processes are filtered through the institutional context in which our cognitions operate and in which our minds interact with other minds (Gigerenzer, 2008; Polanyi, 1951, 1958). In other words, institutions and social structures—with their rules and incentives—guide our interactions and real experiences, providing the mindset and framework that structure our interpretations of reality, shaping personal cognition and knowledge (Gigerenzer, 2008; Hodgson, 2004).

Institutions shape and define restrictions, the incentive structures and context in which individuals interact (North, 1994). The institutional context matters for guiding and incentivizing the development of specific actions and social interactions, and then producing wealth-enhancing social outcomes. The same principle and role of the institutional context in guiding action and collaboration also apply to cognition and mind–mind relationships (Boland, 1979). By establishing rules and particular mechanisms of social relations, they influence cognitive processes and the knowledge present in different institutional settings (Lavoie, 1985). How institutions guide and provide the mechanisms of social relations also affects the interaction and communication among the minds, significantly shaping also the cognitive processes that occur not only at the individual level, but also at the level of epistemic resources formed as outcomes in the entire society.

Institutions then are social institutions, and by shaping cognition and mind–mind relations they have a profound role to play in social ontology and cognitive complexity (Ingham, 1996b; Lawson, 2016). We need to recognize that acting and thinking exist in a social context marked by experiences generated through interacting with other individuals, and hence cognition and mental processes are 'embedded in concrete, ongoing systems of social relations' (Granovetter, 1985, 487).

[37] Therefore knowledge is here conceived as 'a kind of spontaneous outcome of . . . [individuals] interacting under certain special circumstances within a particular kind of community' (Lavoie, 1985, 58).

Seen in this light, institutions enable novel mind-to-mind interactions to emerge, shaping mental processes and making complex epistemic social phenomena possible (Polanyi, 1951). Such novel epistemic phenomena arise from the unique interactions and communications among the minds present in those specific institutional contexts (Hayek, 2014 [1967]). Institutional economics—in its neoclassical form as new institutionalism—has largely disregarded contextual cognition and the epistemological and ontological implications of the relationship between institutions and the manner in which minds are related in a given context (Boland, 1979; Granovetter, 1985; Hodgson, 2000a, 2004).

The mind itself, for example, is a complex order that evolves and arises from rules and procedures that govern acts of classification, neural-electrical patterns of relations, and perception at the individual level (Hayek, 1952b, 1979). Furthermore, the mind cannot be reduced to nor explained by the behavior and properties of the neurons in isolation (Hayek, 1952b). Thus the biological rules and mechanisms that govern and guide neural-electrical patterns, neural interaction, and acts of classification are crucial to determine the emergent properties and complexity of the mind. Analogously, our 'social intelligence' is a complex emergent outcome of a system of specific and recurrent processes of communication and interactions among agents and minds (see also footnote 17). In other words, it is an organizing social structure defined by a set of rules and institutions that guide our mind–mind relationships and shape the specific manner in which individuals are connected and cognition formed.

Therefore, the institutional context and rules define social interactions, particularly the interactions between minds, affecting not only material outcomes but also the social intelligence developed under them. Similar to the mind–neuron structure (Hayek, 195b), social intelligence is produced as a higher-order epistemic outcome, more complex than and irreducible to the unstructured aggregation or simple sum of minds involved and their properties in isolation (Lawson, 2012; Lewis, 2016). This ultimately suggests that institutions matter for producing social intelligence through affecting and defining the mechanisms throughout which minds relate, and the recurrent way in which individuals can connect or communicate (Lavoie, 1985; Ostrom, 2005).

Consequently, knowledge and coordination, much like money itself, 'should be seen as having "social" [institutional] conditions of existence' (Ingham, 1996a, 509). However, social scientists have remained largely silent on these matters, suggesting that a complexity or systems theory related (coupled) with institutions and institutional analysis is warranted (Lewis, 2016; Ostrom, 2010). Institutions could also enlarge the social order and allow processes of self-organized (rule-guided) responses and interactions among agents. Such rule-guided responses and social relations could lead to the emergence of unique beneficial social properties distinct from those held by the separate individuals and irreducible to their unrelated properties (Lewis and Wagner, 2017). These new social phenomena stem from *specific* institutional contexts, possess different ontological properties, and display an emergent order that possesses some regularities, thus forming a process-based 'organized complexity' (Hayek, 2014 [1967]).[38] In this sense we can argue that institutions help to broaden the 'social mind' (Boland, 1979).

Importantly, this *conditional* emergent complexity that arises from particular sets of social relations *and* rules-based systems is what accentuates the underdeveloped relationship between institutions and emergent knowledge. Knowledge, then, can be conceptualized as an emergent property indivisible from—and a direct outcome of—the specific and contextual rule-guided social processes by which we relate and perceive (Polanyi, 1966; see also footnote 18). Similar to the mind then, the market and monetary practices are not only mechanisms to mobilize and convey existent fragmented knowledge (Hayek, 1948 [1945]), but perhaps more importantly, an overlapping set of monetary, exchange, and property institutions that sustain a creative socio-relational process which allows novel epistemic

[38] 'Organized complexity here means that the character of the structures showing it depends not only on the properties of the individual elements of which they are composed, and the relative frequency with which they occur, but also on the manner in which the individual elements are connected with each other' (Hayek, 2014 [1975], 365). See also chapter 1.

complexity to emerge. Thus, some institutions—such as money—enlarge our collective or social intelligence by providing specific mechanisms and mediums for establishing coherent and orderly social interactions, which could increase the amount and quality of epistemic resources available (Lavoie, 1985).[39]

2.5 Social Epistemology and the Growth of Knowledge in Science and Markets

The aforementioned relationship between institutions and the emergence of knowledge is not limited to markets. In fact, Michael Polanyi, when he studied the sociology and social theory of scientific knowledge (Polanyi, 1951), suggested, first, the crucial role of institutions, norms, and culture in providing the framework in which certain social processes can be generated, producing unintended beneficial outcomes and scientific social relations for the discovery of new knowledge. Second, he noted how that new scientific knowledge could only be generated exclusively from precise competitive and rule-following academic social contexts (allowing knowledge, beyond the individuals' capacities, to accumulate in the Republic of Science) (see also Scott, 1995).

Following Polanyi's sociology of knowledge, the crucial epistemic and coordinative role I am suggesting money has, and the relevance of its institutional and banking framework, appear to be just a special case of a more generalized ontological and emergentist property of certain institutions in producing organized complexity (Lewis and Wagner, 2017; see also chapter 1).[40] Specifically, it appears that certain institutional frameworks have ontological and complexity implications for knowledge, in that their rules and norms allow the formation of complex epistemic systems by enlarging and sustaining rivalry, routine and orderly mutual adjustments, and specific connections and interactions among agents (Lavoie, 1985; Lawson, 2012; Paniagua, 2018c). Thus, there is a general ontological property and emergentist relationship between rules and institutions defining the manner and means of interacting, and the complexity of outcomes that arise from them (Hayek, 2014 [1967]).

Institutions are sets of rules that define, constrain, and allow organisms to relate, communicate, and act according to some general and uniform principles by which more highly organized and complex phenomena can occur at the societal level (Lawson, 2012). This suggests that if individuals follow certain rules *and* use specific media for social relations (interactions), they can produce a new definite order for the whole. In Polanyi's (1951) terms, the spontaneous formation of a polycentric order is produced by the multiple responses and relations of the individuals interacting and responding to their respective institutional surroundings (Ostrom, 2005). Hence the social outcome generated by people's interactions under specific institutions is orderly and possesses new ontological and qualitative properties (Lawson, 2012).

Consequently, institutional settings define rules of behavior and the mechanisms of interactions, such as academic rivalry (contestation) among scientific theories in science (Lavoie, 1985). In such an institutional context, academic interactions, the contention among theories, and scientific discussions could produce new knowledge and the discovery of unexplored scientific theories (Polanyi, 1951, 1958). This scientific knowledge is a particular form of relational and social-based scientific knowledge neither previously located, nor contained in, individuals' minds prior to the scientific process; and not fully located also in

[39] This relates to the growth of knowledge under specific social processes guided and defined by certain institutional frameworks. See for example Hayek's and Polanyi's conception of the social spontaneous growth of knowledge in the market and in the scientific community (Hayek, 1979). In them, relevant knowledge is *socially created* as a direct process of rule-guided social interactions and contestations among minds, interactions that eventually enrich the social intelligence and would not exist without specific institutions, norms, and rules (Polanyi, 1951).

[40] Following Polanyi (1951), it has been argued that the emergent *rationality* of scientific knowledge resides 'in the particular kinds of social processes taking place in the scientific community as a whole and guided by tacit judgments of its skilled participants. It is through the tensions and pressures generated by struggles among scientists . . . that the process succeeds in continually discovering new knowledge. . . . Scientific knowledge, then, is seen as an evolving outcome of the interplay of scientists who exercise their tacit skills' (Lavoie, 1985, 63).

a reducible form to the sum of the scientists' separate consciousness (Polanyi, 1951). Therefore, those new scientific discoveries and ideas that arise from such professional relations and academic contentions cannot be said to exist at all separate from the specific academic culture, norms, and processes in which scientists interact (Polanyi, 1966; Scott, 1995).[41]

The identified relationship among institutions, cognitive processes, and the social mind as a complex phenomenon that arises from such institutions and processes suggests that rationality and cognition are contingent social processes not entirely separable from norms, social interactions, and institutions (Gigerenzer, 2008; Ostrom, 2005; Weber, 1978). Human rationality and cognition are social, contextual, and largely determined by the institutional setting that frame our subsequent interactions and forms of thinking. The same 'institutionally contingent principle' applies also to market rationality and rational economic choice (Gode and Sunder, 1993, 1997; Weber, 1978). Hence the unique function of money and markets in enabling economically relevant and more complex knowledge to arise seems to be just a special case of those general complex institution–society–mind relationships that seem to be ubiquitous in most social orders based on interactions (Lewis, 2016; Lewis and Lewin, 2015).

Indeed, Polanyi's example of a complex social system in which, through rivalry in specific settings, individuals unintentionally produce higher-order epistemic outcomes in society can be related to, and its properties actually generalized through, the theory of complex systems (Colander and Kupers, 2014). It appears that the growth of knowledge in society, and the discovery of new knowledge by individuals, are decentralized emergent phenomena that are highly contextualized and dependent upon the established rules and social relations among them (Polanyi, 1951). As hinted in chapter 1, social relations can be described in *general terms* through institutions' sets of rules (replicator dynamics) and the medium of societal interaction that affects the general patterns of collaboration (Colander and Kupers, 2014). As the example of scientific discovery suggests, the social context in which knowledge is assembled, evaluated, and developed appears to be highly dependent upon the institutional framework and norms by which individuals interact (Polanyi, 1958). The growth and development of novel scientific knowledge, for example, is largely dependent upon, and indivisible from, the procedures and rules by which scientists relate, communicate in journals, and criticize their theories (Polanyi, 1951).

The key insight from Polanyi's (1951, 1958, 1966) social theory of scientific knowledge is that knowledge itself and its growth are emergent social phenomena. Knowledge is an emergent social structure indivisible from societal processes and rivalrous relations among agents and specific institutions (Lavoie, 1985). Therefore, a vast and relevant extension of knowledge available in society cannot be meaningfully conceived as existent anterior to and separate from the unique institutional framework that provides both the rules and specific mechanisms by which minds relate and interact. This indicates that knowledge possesses deep complex and ontological characteristics related to emergence and institutions (Lewis and Lewin, 2015; Lewis and Wagner, 2017).

This point has important implications since it suggests that knowledge is not only specific to the environment in which individuals engage in cognition. It is also indivisible from social networks, social relations, procedures, and media of interaction that individuals establish in a given context (Buchanan, 1982; Paniagua, 2018c). Thus 'the existence of emergent properties [such as knowledge] depends not only on the presence of particular agents but also on certain relations to one another' (Lewis and Wagner, 2017, 10; see also chapter 1). Institutions and media of social relations (such as money) form the unique social and ontological bridge between the limited individual mind and the higher-order level 'social intelligence' present in society (Lavoie, 1985).

This idea concerning how knowledge is developed in society relates also with some recent advances in

[41] See, for example, how knowledge advances in science. The social processes of argumentative dialogues and contestation among alternative ideas allow science as a social order to advance (Polanyi, 1951). Scientific discovery (or 'truth') is an outcome that advances from the process of professional contention and relationships among the scientific community.

social epistemology (Longino, 1990). For instance, the philosopher of science Philip Kitcher (1993), applied social epistemology to the understating of the scientific community. He argues that scientific knowledge is developed by rule-following and institutionalized communities of researchers that check and scrutinize each other, and that those contestable processes play a fundamental role in the advancement or rejection of particular methods toward understanding. Kitcher further recognizes that science is done, not by logically omniscient scientists working in isolation, but rather by socially connected people with a variety of personal and social interests, who both cooperate and compete with one another under certain specific institutional structures. Thus, we have to conceive the growth of science and knowledge as social processes in which both our vision of nature and our ways of learning more about nature improve (Kitcher, 1993, Longino, 1990).

Hence, Kitcher also argues that academic institutions and rules that scientific communities possess, demarcate the conceptual language, define the set of questions that are deemed important, establish acceptable modes of explanation, and highlight the paradigms of acceptable scientific reasoning. For both Polanyi and Kitcher then, the scientific undertaking is an ongoing social process for truth, and scientific communities are *institutionalized* "epistemic communities" (Haas, 1992), and thus "machineries of knowing" (Knorr-Cetina, 1981).[42]

Indeed, after the work of Polanyi (1962), Kuhn (1994), Kitcher (1993) and others, the social embeddedness of scientific production has become better understood. Instead of the old romantic picture of the isolated and reflective scientist, today we have acknowledged that effective inquiry and the advancement of science *requires* an interactive network of scientists embedded in certain specific institutional milieus and following specific rules and social procedures. Science and scientific knowledge consist of coordinated practices and interactions performed under certain institutionally structured social communities (Hodgson, 2019, 134). Science thus possesses a crucial social and interactive dimension.[43]

Thus, scientific communities, under certain institutions, and social and academic rules, become decentralized coordination systems that produce novel knowledge nonexistent before the establishment of such socio-interactive communities. Given the scale and complexity of any science, and the enormous amount of knowledge and information involved, individual scientists cannot make sound and rational appraisals or scientific scrutiny on every single scientific aspect. Thus, scientists depend on the contestability and the screening capacities of others, which requires also certain level of trust, mutual respect and consensus. In other words, for science to function properly and produce knowledge, it requires some level of sharing and coordination of knowledge—through the guidance of rules and consensus—in order to keep science together, to scrutinize new knowledge and, finally, to enable progress. Hence, under the perspective of social epistemology, science is "a cognitive organism of intersecting individual knowledge" (Hodgson, 2019, 135). These are the fundamental reasons why science cannot be centrally planned or conducted by a benevolent despot or bureaucrat.

As Hodgson also acknowledges:

> Science advances through critical scrutiny and dialogue with experts in the same field. Hence science requires concentrations of specialists who intensively interact with one another, to correct errors, to pose alternative hypotheses, to check results, and to draw attention to related work in the area. … science is a social process and it works partly through the creation and ongoing amendment of established positions in a scientific

[42] On these issues related with social epistemology, the production of knowledge and scientific communities see also Fuller (1988) and Longino (1990).

[43] For instance, Michael Polanyi argued that: "Scientific opinion is an opinion not held by any single human mind, but one which, split into thousands of fragments, is held by a multitude of individuals, each of whom endorses the other's opinion at second hand, by relying on the consensual chains which link him to all the others through a sequence of overlapping neighbourhoods" (Polanyi, 1962, 60). Polanyi's 1962 essay is considered to be his classic summary statement on the socio-interactive and spontaneous nature of science.

> community … It involves 'epistemic communities' and institutionalized 'machineries of knowing'. In any scientific community there is a trade-off between diversity and consensus. (Hodgson, 2019, 17; 122)[44]

Consequently, these insights from social epistemology suggest that knowledge is not only personal, but also socially dependent and highly sensitive to context and the social milieu. The creation of knowledge then appears to be highly dependent upon how interactions are established and choices unfold within institutions. Moreover, its social form and valuable content cannot be known anterior to and outside of the social processes in which it can be created (Buchanan, 1982). Therefore, it is best understood as a particular complex 'whole' composed of, and indivisible from, a dynamic set of social relations (Lawson, 2016). Thus, "knowledge is open-ended and knowing involves processes of discovery and creation. . . . The interactive dimension of the knowledge-creating process requires activities and capabilities to develop individual and social communication channels. . . . Institutions are means for the creation of knowledge and they are 'places' where knowledge is developed" (Rizzello and Turvani, 2002, 201).

A satisfactory analysis of social intelligence and collective rationality 'requires knowledge not only of the isolated parts but also of the relations in which those parts stand to each other and, therefore, of rules governing how the parts related and interact' (Lewis and Wagner, 2017, 10). This institutionally dependent property of the development of knowledge appears to affect all social processes individuals are engaged in, producing social phenomena distinct from those possessed by individuals before those interactions ever took place (Lawson, 2012). Returning to Polanyi's (1951) illustration of scientific discovery, the knowledge that stems from such a context would not exist if scientists did not have the institutional setting with the freedom to pursue their projects and the academic competitive—but rule following—relations among them. Outside of specific complex social systems of relations, such as the free competitive scientific community, the 'epistemic whole' or 'social intelligence' would not be more (and would perhaps even be less) than the sum of its parts (Colander and Kupers, 2014; Polanyi, 1966).

In the absence of certain institutional structures and specific media of relations (such as money) that allow us to socially connect in orderly manners to produce organized complexity, knowledge is not only not institutionalized, but also *nonexistent* and hence impossible for society to use (Buchanan, 1982). Following this view, money is not only important (as the neoclassical framework argues) because it maximizes individuals' utilities, and reduces informational problems and transaction costs (Alchian, 1977; Jones, 1976). It is also vital since it provides the *social context* or unique 'place' that shapes and determines our exchange interactions in the market and the specific assembly of our mind–mind relationships, producing complex social intelligence (see also footnote, 17).

Consequently, money enlarges the social mind (or social intelligence)—beyond language—through expanding the set of possible regular relations, by providing a homogenous mechanism by which elements can be recursively and systematically connected through debt and exchange relations. Thus it enriches economic knowledge with 'more highly organized phenomena' (Hayek, 2014 [1964], 263), economic and coordinative phenomena previously absent (non existent) before the use of money in exchanges (Howitt and Clower, 2000). Money uniquely broadens the 'interactive dimension of the knowledge-creating process' (Rizzello and Turvani, 2002), expanding the social order and regularity of our interactions beyond language.

2.6 Money and Economic Knowledge as Complex Phenomena

The key to understanding the role of money in sustaining coordination and ameliorating the economic problem resides in recognizing that a relevant portion of our knowledge is not linguistically articulable and is institutionally dependent or contextual. Economic knowledge, much like scientific knowledge reviewed in the previous section, is difficult to generate and largely depends upon the institutions from

[44] On these issues concerning social epistemology, communities, and the advancement of science see also Knorr-Cetina (1981).

which its springs (Lavoie, 1985; Paniagua, 2018c). Its existence, as suggested above, is conditioned upon a set of institutional structures that encourage certain coherent social interactions.

The reason why money is indispensable in society is that it itself becomes a new system of intricate social relations and engenders, throughout its use, a wider system of previously nonexistent relationally organized patterns of interactions among individuals (Ingham, 1996a; Lawson, 2012). Accordingly, it generates an organizing structure or a wider social configuration with novel ontological and coordinative properties (Lawson, 2016). This monetary institutional framework provides the context where relevant and complex economic knowledge is ultimately developed.[45] The social development of market knowledge, much like knowledge in the scientific community, uses decentralized and personal knowledge and arranges it, through monetary-social relations, into novel totalities or ontologically more complex epistemic resources (Read, 1985; see also footnote 23 for an example).

In other words, there is a crucial ontological and complexity-based difference between the coordination and knowledge attained and structured *through* monetary relations, and the *ex ante* knowledge disseminated and held in individuals' minds without them (or anterior to the use of money in exchanges) (Buchanan, 1982; Howitt and Clower, 2000; Paniagua, 2018c). Or as Horwitz (1992a) has also recognized:

> To view the shift from direct exchange to monetary exchange as simply the redistribution of existing information, as do a number of general equilibrium approaches, is to miss the crucial point that such a shift *creates* what previously did not exist in any accessible form. (Horwitz, 1992a, 88)

Thus money allows novel economic knowledge and coordination to emerge and be expressed as the unintended social outcome of the system of social and debt relations intermediated, denominated, and constituted by its widespread use. For instance, '[a] market characteristic of a good, such as salability or scarcity in comparison to wants, is not a piece of objective information . . . Rather such knowledge can be revealed or created only through the actual process of economic exchange . . . actors discover which goods are more or less salable—knowledge that was previously unknown' (Horwitz, 1992a, 87).

Such an epistemic and coordinative role of money has largely remained unexplored in the literature (Gilbert, 2005; Lawson, 2016; Smithin, 2003). Money is therefore indispensable in a capitalistic society because it provides the social means and unique *relational mechanisms* for establishing orderly exchange and debt relations by which we can subsequently develop relevant higher-order market knowledge, through complex and recurrent monetary arrangements. Moreover, the formation of these epistemic resources and orderly exchange and debt relations could ameliorate the coordination problem of decentralized trade (Howitt and Clower, 2000).

Additionally, throughout such monetary system of social and debt relations, we can obtain emergent, unanticipated, and wealth-enhancing properties through those novel epistemic and complex

[45] An example of economic knowledge as a complex and emergent phenomenon is the *ex post* emergent property of the salability of money (Horwitz, 1992b). The knowledge concerning the unique salableness or (near-)perfect liquidity of a certain good (asset) that will be used as money is a contextual and social characteristic that needs to be generated ex post (after) exchanges, and is constituted through a network of path-dependent social interactions (Howitt and Clower, 2000; Jones, 1976; Menger, 1892). Importantly, such knowledge concerning money's salableness (or extreme liquidity) *does not* exist disseminated (fragmented) or anterior to the dynamic social interactions that specifically constitute it. In other words, 'the process of the evolution and use of a medium of exchange do not merely redistribute existing, objective knowledge from actor to actor but rather create knowledge that did not previously exist' (Horwitz, 1992a, 87). Moreover, economic knowledge, such as the market characteristics of goods and that arise from market interactions, cannot be considered as (nor is it ontologically reducible to) the outcome of a mere redistributed or aggregated sum of existing tacit knowledge present in society (Buchanan, 1982). See analogous ontological and emergent properties in Polanyi's (1951) example of scientific theories, Hayek's example of the mind (Hayek, 2014 [1967], 1973) and Leonard Read's (1985) example of the pencil. Money itself, similar to knowledge, can only be conceptualized and understood as an emergent complex property stemming from a configuration of social relations (Ingham, 1996a).

arrangements. Without the use of money to: first, define and express prices and our debt-economic relations; second, to relationally organize our interactions in specific homogenous manners; and finally, to sustain new coherent and regular methods of social relations, we would be unable to arrange the disseminated knowledge in an organized (coherent) but intricate way that develops new meaningful and complex knowledge (e.g. the allocation-distribution result of markets) and other emergent properties.

Put somewhat bluntly, without the use of money, both the efficient allocation-distribution outcome of markets, and L. Read's (1985) example of the efficient creation of the pencil, would become practically epistemic and technical impossibilities for those societies that do not rely on money to intermediate exchanges (Lavoie, 1985). This is because the arrangement (concatenation) of all the specific and scattered knowledge, and productive elements (technical inputs) *required* to produce allocation-distribution results and pencils efficiently—which are forms of economic knowledge—can *only* arise and be assembled through market processes sustained by orderly exchanges intermediated (enhanced) via an homogenous and pervasive medium of exchange.

Consequently, without money society would be incapable of supporting a sustainable rational economic order that possesses higher degrees of 'social intelligence' and epistemic wealth-enhancing properties irreducible to and not contained in the sum total of the preexistent unrelated elements. In Buchanan's (1982) words:

> [T]he 'order' of the market emerges *only* from the *process* of voluntary exchange among the participating individuals. The 'order' is, itself, defined as the outcome of the *process* that generates it. The 'it,' the allocation-distribution result, does not, and cannot, exist independently of the trading process. Absent this process, there is and can be no 'order.' . . . Individuals do not act so as to maximize utilities described in *independently existing functions*. They confront genuine choices, and the sequence of decisions taken may be conceptualized, *ex post* (after the choices), in terms of 'as if' functions that are maximized. But these 'as if' functions [a form of economic knowledge] are, themselves, generated in the choosing process, not separately from such process. If viewed in this perspective, there is no means by which even the most idealized omniscient designer could duplicate the results of voluntary interchange. The potential participants *do not know until they enter the process* what their own choices will be. (Buchanan, 1982, 5, emphasis in the original)

Along similar lines, Amartya Sen (1993) has also recognized that in regards to market efficiency, '[t]here is also an informational problem . . . to achieve social optimum. The informational economy [epistemic properties] of the market mechanism [ex ante] does not cover the information needed to ascertain the set of feasible [ex post] market outcomes and to pick the socially best from that class' (Sen, 1993, 522n7). Neoclassical economics in general misses this aforementioned 'epistemic-generative' role of money since it 'cannot easily accommodate any role for underlying social structures including, on one level, social relations' (Ingham, 1996a, 527).

2.6.1 The distinction between means of exchange and means of payment

Since Menger's (1892) theory on how money spontaneously evolves to overcome the deficiencies of barter, there has been a rather asymmetrical focus on money as the medium of exchange, when compared against money as means of payment and as unit of account. Menger (1892) maintained that money had only one (primarily) function in markets, as the medium of exchange, establishing that money as the means of final payment was not a distinctive and relevant function (Ingham, 2000). There is still 'a tendency to use the two functions interchangeably, but the distinction is an important one that helps to distinguish different types of economic transaction' (Ingham, 2000, 20).[46] In spot, small, and continuously

[46] An example of this difference is in dual-currency systems of the earliest times, in which base-metal tokens were used as means of exchange in small and spot transactions. But precious-metal coinage was instead legally valid as means of payment

operating trades, abstract purchasing power in the form of exchange money (as the means of payment) need not actually be held for a long period of time, and the actual 'money-stuff' of media of exchange is what intermediates those exchanges. However, in modern economies most exchanges and economic transactions—relevant for the formation of intricate economic knowledge—are not performed in spot transactions using the 'money-stuff' of actual media of exchange or *valuata* (the asset that constitutes the medium of settlement and payment) (Smithin, 2000).

Indeed, currently, bank liabilities (a type of commercial debt relations), particularly in the form of bank deposits generated by commercial banks and arising from bank credit, are commonly and broadly conceived also as money (as debt relations). In addition, banknotes, which in most societies today means central bank notes, are money as debt relations with respect to the state or the monetary authority that issues notes as central bank liabilities. Money therefore not only refers to banknotes, but also refers to deposits arising from bank credit, and these bank-deposit liabilities actually provide nowadays most of the means of exchange used in markets (Laidler, 1990; Smithin, 2000).

Hence the overall money supply in the economy, used to enable the broad, crucial, and orderly monetary market exchanges emphasized in this chapter, consists today largely of bank deposits and not only of banknotes (Laidler, 1990), even though both of them are forms of money as debt relations and 'a symbol or signifier of states' and banks' promises to pay' (Ingham, 2000, 23). Therefore, commercial bank deposits in addition to banknotes are a crucial type of bank liability (and money) and a part of the broad system of debt-social relations that sustains and extends the ontological transformation of economic knowledge through market exchanges. We need to recognize that what we conceive of today as the medium of exchange, which enables a widespread system of orderly exchanges, consists of forms of bank liabilities or debt relations (conceived of as money) that are not narrowly limited to banknotes but also include bank deposits. Nowadays these liabilities (debt relations) provide most of society's actual means of exchange (Laidler, 1990).

Accordingly then, modern transactions involve instead contracts and deferred (final) payment or settlement usually denominated in money (abstract value), and they also can include debt relations with payments in kind. Thus here the 'actual money-stuff is not required for the immediate transactions' (Ingham, 2000, 18). Hence most exchanges and widespread socio-economic relations are sustained and performed through credit and debt relations—such as bank deposits, mentioned above—and not through the conventional 'money-stuff', which is usually used as the means of (final) payment. Thus 'money is uniquely specified, first, by being a measure of value/unit of account and, second, by the capacity to store abstract value in a universally accepted form that enables it to act as a means of payment' (Ingham, 2000, 21).[47]

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to settle and exhaust official debt relations (Ingham, 2000n15). In this case, we can see how debt (deferred payment) relations are indeed means of exchange, but not legally granted and final means of payment. Moreover, base-metal tokens were neither habitually used as means of exchange in large and important transactions (hence the existence of a multiplicity of means of exchange), nor as means of payment in debt relations. Nevertheless, the focus in this chapter is on money as a means of exchange (including debt relations) because means of exchange are the socio-relational mechanisms that are *required* to generate 'immediate transactions', and to sustain the 'extensive and complex monetary practice (as opposed to barter)', and also that they can be generated even in the absence of a universally acceptable means of payment (Ingham, 2000, 18).

[47] An asset can only be accepted in payment if it works also as a good store of value. This allows money—as a store of abstract value—to be withheld from exchanges because of increased liquidity preferences. Liquidity preferences are informed by local interactions, by social conditions, and by the level of economic uncertainty in markets. Thus factors that determine liquidity preferences have a large interactive and social dimension, and they also play an epistemic signaling function. Individuals, in determining liquidity preferences, draw from market knowledge, social signals, and market conditions that inform decision-makers. Thus we have an epistemic feedback mechanism or an endogeneity process within the use of money and the determination of liquidity preferences. Monetary relations have a unique function in the formation of a higher-order and ontologically distinct economic reality and in the emergence of market phenomena. Subsequently, those same emergent market conditions, constituted by monetary relations (and their inherent unpredictability), feed back into the decision-making level informing individuals about market conditions and their level of uncertainty, influencing back again liquidity preferences and the use of money (a feedback loop).

In modern capitalistic economies, money as the means of exchange can take different forms (multiplicity of media of exchange) and includes spot trades—performed through conventional money (*valuata* or base money)—bank liabilities in the form of bank deposits, and debt (or deferred payment in a final means of settlement), which is a social relation (Smithin, 2000; see also footnote 24). Moreover, money, instead, as the (final) means of payment or settlement of debt is generally 'hierarchical in nature' and does not include all forms of debt relations (deferred payment) since, by their nature and definition, they cannot logically be an ultimate and final form of payment to settle and exhaust debts (promises to pay) (Smithin, 2000, 6). Even if there is a multiplicity of means of exchange, including debt as social relations, there must be an object or a unique (financial) asset that plays the role of the generalized medium of payment and settlement and helps in the final liquidation of debts and liabilities.

Today, in modern capitalistic societies, that object (or asset) is represented by specific *institutionally legitimate* signifiers of debt and payment, issued by states and banks (Ingham, 2000). In other words, 'even if there is a multiplicity of media of exchange in any given monetary system, there invariably seems to be a unique asset which constitutes the medium of (final) settlement' (Smithin, 2000, 6). Therefore, money as the means of payment refers to a different type of economic transaction (and a narrower range of assets) that occurs to settle and extinguish promises to pay and to settle credit and debt relations. Additionally, the actual 'money-stuff' that constitutes the means of (final) payment, and 'namely that by delivery of which debts contracts and price contracts are discharged[,] . . . can only exist in relation to a money of account' (Keynes, 1930, 3).

Money as means of payment, then, as Keynes (1930) noticed, is hierarchical and differs from the different and multiple exchange media insofar as it is only produced by legitimately sanctioned agencies or banks, and it is uniquely related (and closely tied) to and defined through the unit of account (Ingham, 2000, 32). This form of settlement is also a different type of economic transaction that occurs at a later date (probably even in a different place) and after the immediate transaction and exchange relation performed through money as the means of exchange (see also footnote 24). As hinted earlier in this chapter (see section 2.1), money, as the ultimate means of payment or settlement, can be considered as outside money, which is usually a commodity (material) money or 'money stuff' that *does not* circulate from hand to hand enhancing trade. Instead, money, as the generalized means of exchange can be actually considered as inside money, which is usually represented by bank liabilities (or wide debt relations) such as currency and demand deposits issued by commercial banks and held (accepted) by the public (Laidler, 1990; Selgin, 1988; Smithin, 2000).

Wicksell (1967 [1906], 17) defined the generalized medium of exchange as an asset not to be particularly used in consumption or production but 'which is habitually, and without hesitation, taken [on its own account] by anybody in exchange for any commodity' (see also Clower, 1984b). Hence today, it could refer to any particular asset (or specific credit and debt contract and relation) in the economy that is generally and habitually accepted as an exchange medium in exchange for goods and services, or socio-economic debt relations that *intermediate* and enhance the process of exchange (Smithin, 2000).

In contrast, the notion of means of payment refers to an object (or asset) that can be used to ultimately pay for purchases and to extinguish or settle (the final discharge of) any debt, a different type of economic transaction that occurs subsequent to the use of debt relations (such as bank deposits) or money as exchange media in initiating the exchange (Smithin, 2000). As such, it is here of a different (minor) order of relevance in the functions of money that involve the enabling and enlargement of debt and exchange relations (and thus in the formation of complex market knowledge), since an extensive and complex system of monetary and debt practices and of money prices—one that actually sustains the process of orderly socio-monetary relations that enlarges the 'social intelligence'—is perhaps possible without a universally acceptable and legally defined means of payment (Ingham, 2000, 18; Horwitz, 1992a).

Hence for the scope of this chapter, I focus on and refer to money as the *generalized means of exchange* and

not particularly as the means of payment (and settlement), in the Wicksellian sense stated above—which includes in modern capitalistic economies conventional exchange media (banknotes), liabilities in the form of bank deposits (bank-deposit liabilities), and credit money and debt (deferred payment), a social relation—as, in addition to the money of account, a crucial (and necessary) aspect of money in establishing an orderly and widespread system of complex monetary practices and exchanges that have ontological and emergent epistemic implications (Horwitz, 1992b).

2.6.2 Orderly exchange relations and emergent irreducible totalities

As suggested previously, money is able to accomplish an epistemic role through its pervasive and ubiquitous capacity to mediate almost all market exchanges and unintentionally generate knowledge through them. Money's function as a medium of exchange allows it to 'touch', intermediate, and be part of all (or most) economic transactions (Clower, 1984a, 1984b). Therefore, money is a pervasive and ubiquitous element in markets, and all markets indirectly become markets for money (Yeager, 1968, 1986). This allows all prices in the economy to become money prices and hence to convey the new emergent phenomena of knowledge in a homogenous form of symbolic communication. The fact that money mediates and symbolizes new social relations is hardly a new insight in sociology (Dyer, 1989; Marx, 1973 [1939]). However, the emergent properties of more highly organized complexity and the ontologically different epistemic phenomena that stem from them, and how these properties ultimately relate to the coordination problem, are crucial macroeconomic and coordinative implications of the use of money not fully developed in the literature. This suggests that the ontology of money is inseparable from sociology and perhaps also from macroeconomics (Ingham, 1996b).

Money, by becoming the generalized medium of exchange, allows—similar to language—a single and similar-in-kind (homogenous) process of expression and socialization of knowledge. Thus, 'money and money prices make possible [novel] orderly processes between economic actors' (Horwitz, 1992a). This subsequently allows a complex organized system to form (Lewis and Wagner, 2017; see also chapter 1). A crucial aspect of money's role as the generalized medium of exchange is how it connects and relates people together into new and *similar-in-kind* social interactions, by 'facilitat[ing] the development of an ever widening circle of economic interdependence based on the dispersion of trust' (Frankel, 1977, 14). Indeed, as hinted in chapter 1, such a uniform, extensive, and habitual process of relations sustains and provides the base for a coherent form of repetitive and widespread interactions among individuals, allowing a complex but orderly system to be formed.[48] Thus the pervasive use of money in exchanges allows individuals to transcend their personal cognitive and communicative limitations (Horwitz, 1992b). Thus '[a]ctions taken during the process of exchange . . . bring knowledge from the personal to the social level' (Horwitz, 1992a, 87), acquiring a novel and more complex social use.

Accordingly, money's cognitive task of developing knowledge and promoting economic progress moves away from individuals' narrow cognitive capacities and becomes a social process in which money relations sustain the formation of social knowledge. This process of extended and social cognition produces a type of higher-order knowledge that is more complex than the sum of its parts. The economic knowledge available under money is no longer the sum or aggregation of the fragments and epistemic resources of individuals taken separately, but rather is the emergent phenomenon of specific social and mind-to-mind relationships and nonlinguistic relational processes intermediated *exclusively* through money. Such higher-order epistemic properties are qualitatively different from, and irreducible to, those that individuals could possess if isolated from or outside the social market context that money facilitates.

The most well-known—albeit often overlooked—role of money is its function as the 'generally accepted medium of exchange' (Yeager, 1986). The pervasive property of money in being present in, intermediating, and denominating most market interactions has strong implications for the formation of

[48] See at depth the four crucial properties of organized complexity (including that one concerning orderly and similar-in-kind social interactions) in chapter 1, sections 1.1 and 1.2 (see also Lewis and Lewin, 2015).

our social intelligence and hence for emergent coordination. Money is one side of (almost) every market interaction, and most debt and commercial relations are denominated numerically in the unit of account (Clower, 1984a, 1984b). Money symbolically 'touches' all other goods and commodities by virtue of the fact that it is constantly being traded against them. Thus, every market is indirectly also a market for money, as every exchange is an exchange against money. It is from this role and ubiquity in mediating (bridging) all exchanges that money acquires large epistemic and social implications for coordination and rationality, and shapes society in ways not frequently recognized (Dyer, 1989; Mitchell, 1937).

It is because of money's essential relevance and pervasiveness in the economy, *both* as the only generally accepted means of exchange to intermediate most trades and economic relations, and as the unit of account to coordinate market exchanges and to homogenously express debt relations and market prices, that (almost) *all* market interactions and exchanges are actually coordinated, performed, and expressed through it. Ultimately, 'this pervasiveness of money enables it to function as a means of social communication and dramatically to enhance the evolution of the market and society. Again, the development of the social institution of a medium of exchange is an order-generating process embodying creativity, complexity, and coordination' (Horwitz, 1992a, 87).

Through that pervasiveness in exchanges, and in helping define debt and prices (in addition to defining and developing the standardized means of final payment or settlement), money extends rational calculation and management of debt and wealth, expanding the range of homogenous and orderly interactions and complexity of socioeconomic contact between individuals *beyond* the limits of language and barter. The ubiquity of money, its role as a focal point to denominate and express debt and prices, and its pervasiveness (as the generally accepted media of exchange) in trade are the foundations for its ability to generate a new orderly system of novel epistemic and social relations. Money ultimately forms a new system of social and economic relations that promotes the constant rearrangement and combination of an organizing structure of relevant economic knowledge, which becomes ontologically irreducible to the scattered elements that form it.[49]

Money could be partially perceived as sustaining social cooperation by mediating a new complementary process of extralinguistic (nonverbal) social communication and a process of knowledge transmission or conveyance (Dyer, 1989; Horwitz, 1992a). For example, Horwitz (1992a, 81, emphasis in the original) maintained that money, similar to language, performs an '*analogous* communicative function', and that 'through its ability to make contextual knowledge socially usable, also *extends* the range of social communication beyond the limits of language and the physical senses'. Nonetheless, this relevant extralinguistic role is not to maintain 'that all that happens there, as far as social science [and social theory] is concerned, is communication' (Ganssman, 1988, 306).[50] Framing money's social role merely as an extralinguistic mechanism to communicate or mobilize existent but fragmented (or tacit) knowledge oversimplifies and conceals money's deeper ontological role in determining coordinated and emergent outcomes as complex social phenomena (Lewis, 2015). Indeed, Horwitz (1992a, 89) later acknowledged that for social theory, those '[extralinguistic] articulation processes are never sufficient to describe the knowledge generated and communicated in spontaneous social orders'.

Hence as seen in this chapter, money does play a role as a mechanism of extralinguistic interaction (Dyer, 1989; Ganssman, 1988). However, its crucial role in coordination could better understood as the social

[49] In the words of Marx, under the use of money: 'The whole of this movement appears as a social process. . . . [T]he totality of the process appears as an objective interrelation, which arises spontaneously from nature; arising, it is true, from the mutual influence of conscious individuals on one another, but neither located in their consciousness, nor subsumed under them as a whole. Their own collisions with one another produce an *alien* social power standing above them, produce their mutual interaction as a process and power independent of them' (Marx, 1973 [1939], 196–197).

[50] See also Hayek: 'Even the statement of the [coordination] problem as one of utilizing knowledge dispersed among hundreds of thousands of individuals still over-simplifies its character. It is not merely a task of utilizing [or communicating] information about particular concrete facts which the individuals already possess [even tacitly], but one of using their abilities of discovering such facts as will be relevant to their purposes in the particular situation' (Hayek, 1979, 190n7).

organizing structure in which novel and orderly social relations are created, which further enhances the development of higher-order and irreducible complexity. Money is not solely the mechanism by which knowledge is conveyed, but the context in which further knowledge is generated as a complex phenomenon inseparable from its relational use. Focusing merely on money's extralinguistic role as a means to mobilize hard-to-articulate knowledge underestimates its vital ontological function in generating different and complex arrangements. Money does more than just redistribute existent personal knowledge; it provides the institutional and socio-relational context underlying, and the homogenous mechanisms (money of account and generalized exchange media) that sustain orderly exchange and debt interactions behind complex market relations that encourage the growth of social knowledge as a system of organized complexity.

As suggested in the introduction, it is both the habitual use of money as generalized means of exchange in all processes of trade and market interactions, and its use as the unit of account to express debt relations and prices, that ultimately enable money's pervasiveness to establish new orderly, frequent, and homogenous processes of interactions and exchanges. From both this wide and orderly monetary system of relations and through the means of money and debt relations performed and denominated in the money of account, society can generate a novel self-organizing structure, or a more complex social order *based on* the disseminated and previously unrelated bits of knowledge (Hayek, 2014 [1967]; Howitt and Clower, 2000).

Moreover, this unfolding and self-organizing network of orderly social-monetary relations generates and constantly rearranges the disseminated bits of tacit economic knowledge into new social and epistemic wholes, and specific assemblies or intricate structures of relevant economic knowledge that acquire ontological, qualitative, and new complexity-based properties *not* present or contained in the pre-existent disseminated parts that constitute it (Lawson, 2016).[51] In other words:

> The emergent totalities of which individuals and things are organised as components are, *qua* organised systems, *ir*reducible to the sum total of the elements that come to serve as components just because these totalities are constituted in part by the manner in which the components are arranged or relationally organised [in this case via money]; the relational organisation too is an emergent. As a result, ontological reduction of any emergent totality to the pre-existing elements alone, considered apart from their being relationally organised, is proscribed. (Lawson, 2016, 5)

It is ultimately money's pervasiveness as the generalized medium of exchange that enables it to function as the regular, uniform, and widespread mechanism for individuals to relate and interact in a specific and ingenuous way, enhancing complex phenomena (Hayek, 2014 [1967]; Yeager, 1968). This orderly system of relations establishes 'a coherent structure of causally connected . . . parts' (Hayek, n.d., 4; see also chapter 1). As seen in chapter 1, complex systems such as the monetary-based economy display significant ontological and emergent properties (Hayek, 2014 [1964]; Lawson, 2012). Indeed, the insights from chapter 1 suggest that money does not merely redistribute and communicate hard-to-articulate pre-existent knowledge. Similar to Polanyi's (1951) 'Republic of Science', it rather generates higher-order social knowledge as a conditioned and procedural emergent outcome from those coherent monetary structures and social relations that did not previously exist, and hence such economic knowledge is ultimately not commensurable with or reducible to the sum total of the separate knowledge held by individuals before the process of exchange (Buchanan, 1982). In this important sense we can recognize that money does more than just communicate existent economic knowledge.

[51] Orderly systems of social relations enable 'the "emergence" of "new" patterns . . . [which] means that this larger structure as a whole will possess certain general or abstract features which will recur independently of the particular values of the individual data. . . . Such "wholes", defined in terms of certain general properties of their structure, will constitute distinctive objects of explanation . . . [and depend upon] the relations between the individual elements' (Hayek, 2014 [1964], 261–262).

Market characteristics of goods, their technological and physical properties, their relative scarcities, value added in alternative uses, and other economic knowledge crucial to impart rationality and efficiency to markets can only arise and be derived through specific recurrent patterns of social and mental (monetary intermediated) relations that are sustained through money exchanges and debt relations (see also footnote 23). Money does indeed utilize and incorporate contextual and tacit personal knowledge into the system of social relations (Horwitz, 1992a). But the social outcome stemming from them is a structural or 'organizational system' that is far more complex and richer than its constituent parts (Lawson, 2016).

In other words, economic knowledge is not explicable by nor fully intrinsic to and contained in our consciousness, and ourselves, but possesses a crucial social structure and procedural relational aspect (Marx, 1973 [1939], 1964). Hence it is not merely an unstructured aggregation or the outcome of a communicational process of scattered epistemic bits. Outside those specific relations enhanced by money, such an epistemic structure that sustains and coordinates markets would be absent (Buchanan, 1982). Indeed, if you could take apart the personal 'epistemic pieces' and detach the individuals who use money and comprise the relational monetary components of markets, and if you could later arrange them in an arbitrary fashion *without* money as the specific manner in which they relate, it is highly implausible that the causal power and ontological properties of the knowledge we produced under those monetary relations will re-emerge (Lawson, 2012, 2016). In consequence, the monetary social structure makes the difference for the epistemic resources available in society. Therefore, ontologically and epistemologically, money should never be considered neutral. The crucial role of money consists in becoming a novel system of social relations that encourages the assembly (concatenation) and constant rearrangement of personal knowledge, transforming it later into new emergent and irreducible totalities.

Consequently, money prices do indeed play a semiotic function (Dyer, 1989). However, they do so through the expression of money prices as symbolic representations of the new epistemic relations. Prices could represent (signal) the ever-unfolding complex epistemic phenomena that stem from the myriad of interactions of our minds in markets. Prices then could be interpreted as semiotic outcomes of market complexity. They potentially symbolize and signal in a numeric fashion the emergent and richer epistemic order or the new ontological properties being generated only through money's use and the continuous rearrangement of our mind-to-mind relations. Importantly, the semiotic and coordinative functions of money and prices are *inseparable* from money's social ontology (Lawson, 2012). Hence most of the economic knowledge and social intelligence required to sustain a rational market order cannot be said to exist anterior to and dissociated from the processes of money-exchange relations (Buchanan, 1982; Lavoie, 1985). Economic knowledge is an ontological emergent property of the actual use of money in society and is thus indivisible from the system of social relations money and debt relations engender (see also Paniagua, 2018c).

Hence, analogously to Ingham's (1996a, 1996b) framework, economic knowledge is actually constituted by a complex system of social relations, and money prices are the relations' semiotic representation in markets. Separate acts of exchange performed through money might indeed allow participants to be somewhat able to articulate their tacit and subjective knowledge and transmit it into the price system (Horwitz, 1992b). Nevertheless, when those isolated transactions and relations form part of a homogenous, orderly, and coherent network of social competitive relations (as under money), the interconnected whole will possess epistemic and ontological properties different from and greater than the sum of its constituent parts (Hayek, 2014 [1964]; see also chapter 1).[52]

[52] This does not suggest that money does not play also a role in allowing individuals' knowledge to be 'captured' by the system of prices and in bringing personal knowledge to a social use (Horwitz, 1992b). Polanyi (1951) showed that the process of generating scientific knowledge is intimately linked to rivalrous actions in which we partially articulate and translate tacit knowledge into scientific discoveries. The ontological point here is that the emergence of knowledge from those relational processes *cannot* be reduced to nor explained by the mere communication, sum, or unstructured aggregation of tacit skills and knowledge held *prior* to those specific social and debt-related processes that constitute them and give them form.

Ultimately, the market knowledge concerning goods and services, and formed through monetary interactions cannot be scaled back or reducible to the agents involved in producing it. In fact, it represents a *disjunction* between the micro and macro levels of analysis (Wagner, 2012). Money—as hinted in chapter 1—thus becomes the social bridge between separated minds and society's economic complexity. It assumes a unique relational role that generates a qualitatively distinct and ontological change from the scattered unrelated minds (personal knowledge) toward a coherent epistemic whole (social intelligence), a complexity-based arranging role that no other system of social relations is able to replicate.

I have suggested that economic knowledge can be better conceptualized as a complex phenomenon and an exclusive emergent property of a structure of social and debt relations sustained by the use of money to exchange and define debt contracts. Its relationship with the preexistent knowledge disseminated and held by individuals prior to the social interactions enabled by money is a *nonscalable* emergent relationship and cannot be meaningfully described by aggregation or conveyance. Thus, prices could be better seen as semiotic symbols of such unfolding novel social intelligence and complexity. In sum, money and prices cannot be said to be social institutions that simply communicate and redistribute hard-to-articulate personal knowledge. This section has contended that knowledge does not only possess tacit, social, and institutional properties as suggested in section 2.4. The social production of complex economic knowledge and the constant rearrangement of disseminated knowledge that produces 'collective market rationality' are in themselves a complex organized system of monetary and debt social relations, indivisible from the properties of money surveyed in section 2.2.

2.7 Concluding Remarks: Toward an Institutional Analysis of Money

Building on both the complexity properties and insights about organized complexity surveyed in chapter 1, this chapter has explored a complexity-based theory and ontological rationalization to conceptualize money's unique social dimension and its exceptional impact on coordination through the generation of social knowledge. Complexity and emergentist aspects about money have been neglected both by economists and sociologists (Lawson, 2012, 2016). I suggested that money prices, unlike what has been assumed before, symbolize such emergent complexity by becoming the new guiding signs for the subsequent adaptations of our personal economic plans. These semiotic symbols of complexity and emergent knowledge impart feedback and notify individuals of the unfolding epistemic complexity and rationality of the system as a whole.

Money is a social institution that creates and constitutes a new system of social relations (systematically connected parts) in which unintended and novel epistemic phenomena can arise (see also chapter 1). Therefore, it generates economic knowledge as a complex relational phenomenon. Prices thus are semiotic elements *representing* those unique unfolding higher-order social phenomena (Dyer, 1989)—phenomena that are ontologically and qualitatively different from and irreducible to the tacit knowledge scattered and disseminated in our minds. This indivisible relationship between money and epistemic complexity suggests that prices are far more than the numerical codification or nonlinguistic translation of preexistent disseminated knowledge. Further investigations into the ontology and sociology of money might contribute to understanding in more depth this epistemic higher-order role of prices.

Systems theory suggests that an analogy for understanding money's most critical higher-order role should not be limited to its similarities to language as a medium of communication (Horwitz, 1992a). The linguistic analogy should perhaps be complemented by the sociology of knowledge and the 'growth of knowledge' theory within the scientific community (Polanyi, 1951, 1958). I have argued that money is what ultimately makes the social and epistemological advantages of the market possible. This chapter maintained that the use of money in society is invaluable if we desire to enhance social coordination, cooperation, and market rationality. Thus we cannot deliberately move away from or eradicate money from society and pretend that our social intelligence or collective wisdom will stand unscathed.

Our social complexity and economic knowledge are fundamentally dependent upon money. Eradicating or replacing money would eliminate the only relational mechanism besides language by which novel social relations are extended into wider realms of social and economic life (Frankel, 1977), and thus it would severely curtail our social intelligence. The existence and properties of economic knowledge and prices—crucial for sustaining market coordination—are contingent upon the unique way and orderly manner in which individuals stand in relation to one another in their monetary-exchange relationships. Therefore, market rationality and coordination are emergent properties conditional to individuals, their positions in the market, the monetary institutions, and those institutions' rules (Howitt and Clower, 2000; Smithin, 2004). Without money, the higher-order phenomena built upon our tacit knowledge, skills, and organized relations—phenomena that constitute what we call the market economy—would never exist.

Money plays a significant role in aiding not only the communication of hard-to-articulate existent knowledge, but also the emergence of complex cognitive and epistemic resources that enlarge and sustain coordination *beyond* what individuals could have achieved separately, consciously, or through language. Far from being irrelevant to economic decision-making, money becomes the medium of relations by which economic rationality and market knowledge *can only* exist, thus making it *indivisible* from coordination, rationality, and macroeconomic outcomes (Ingham, 1998; Mitchell, 1937).

Starting from the notion of money 'as a structure of social relations' (Ingham, 1996a, 507), I sought to expand the concept into the complexity properties and implications of emergent social phenomena that such a conceptualization entails. I argued that most of economic knowledge, which is vital for coordination (Hayek, 1948 [1937], 1948 [1945]), is in itself a higher-order emergent outcome and constituted by a system of intricate social relations sustained by money. Economic knowledge is therefore a system of monetary relations. This emergent type of economic knowledge is actually determined by a *process-dependent* network of rivalrous and cooperative complex social processes that only exist throughout the use of money. I hope that the insights highlighted in this chapter can contribute to developing a fruitful conversation between economics, political economy, and sociology in order to overcome the detrimental separation of the disciplines (Ingham, 1996b; Lawson, 1997).

Money does more than merely sustain a process of interpreting and communicating what is actually being held in our minds. By creating an orderly system of interactions, money allows for a constant assembly (concatenation) of personal knowledge, which generates further epistemic resources that are ontologically diverse and qualitatively distinct from the preexistent ones held by the agents. Money is vital to coordination since it is the generative mechanism that shapes market interrelations, affecting the structure of knowledge and markets. Coordination consequently is a *conditioned* emergent property of the workings of money and its institutions over society and over the manner in which individuals can relate (Howitt and Clower, 2000). In sum, money becomes the only socio-relational foundation for the social intelligence and epistemic complexity seen in markets and the basis for the semiotic function of prices as signals of complex 'higher order' phenomena. Commercial societies unintentionally attain a new and wealth-enhancing form of social freedom and enhancement of our epistemic abilities beyond the narrow possibilities we had prior to the use of money as a system of social relations.

Scholars in the social sciences, particularly sociologists and economists, must study seriously the ontological and complex ways in which money may play an emergent role and extend coordination and our social and epistemic associations beyond the realm of power issues and communication. This proposed view differs radically from neoclassical economics, which 'distil[s] the economy from society and culture' (Gilbert, 2005, 357). Instead, complexity theory and systems theory are required to understand 'money's embeddedness in social relations' and its higher-order and emergent social implications (ibid., 357; see also Lewis and Wagner, 2017). Institutions such as money might restrain freedom and our range of action. But paradoxically they also free us from our own individual cognitive limitations, enabling a new kind of social and intellectual-cooperative freedom and rationality to develop—what Polanyi (1951) denominated 'public liberty'. It is a unique social liberty that, when

exercised through money, contributes to the formation of distinctive wealth-enhancing higher-level social orders and therefore is far from an insignificant neutral symbolic veil.

Given that throughout part I of this thesis, money as a system of social relations has been presented to be a fundamental aspect of the formation and dissemination of economic knowledge (chapter 2) and in the generation of macroeconomic complexity (chapter 1), we need to move further our analytical focus toward the monetary-institutional structures—or the monetary-institutional frameworks—that actually 'control' or 'guide' the money supply in the economy (Smithin, 2004). Simply put, once it has been acknowledged that money, as a medium of relations, matters severely in the formation of economic complexity and in the generation of economic rationality—and that these are also fundamental features to sustain the coordination processes of markets (Hayek, 1948 [1945])—henceforward we have to subsequently emphasize, analytically, the crucial role of the monetary and banking institutions (such as central banks) that *actually produce* that fundamental medium of social relations that engenders economic complexity.

As the title of part I suggests ('The Monetary-Institutional Foundations of Complexity and Social Knowledge'), chapters 1 and 2 have argued that the most important elements needed to generate economic complexity, knowledge, and emergent macroeconomic phenomena are, first, the orderly and monetary systems of relations among the parts (the use of money in society) and, second, their associated systems of rules (the monetary institutions) that *define* those orderly monetary relations. As I have suggested throughout part I, the fact that the medium of relations and forms of interaction matter severely in generating organized complexity (see chapter 1, section 1.2) implies also that the rules and institutions (the generator dynamics)—which affect the production, and define the specific uses and forms of, those particular media of relations—matter crucially as well (Colander and Kupers, 2014; see also chapter 1). Consequently, and following those implications, monetary and banking institutions, such as central banks, will become the core focus of analysis in the following chapters.

Part I has argued that both the use of money in society and its associated banking institutions are the two crucial elements that generate emergent macroeconomic complexity and its irreducible higher-order properties, as explored in depth in chapter 1. Accordingly, and as the quote from Lewis and Wagner (2017) that opens part I also suggests, the *inexorable* existence of organized complexity and of emergent properties within macroeconomics (as argued in chapter 1) indicates that there is a novel, and thus-far largely unexplored—complexity-based and distinctive political-economic subject matter for macroeconomic research. And thus there is a potentially necessary and intellectually valuable, yet mostly unexplored, subdiscipline within macroeconomic analysis that requires a deep and scientific, but potentially nonformalist, shift of focus toward monetary relations, emergence, monetary institutions, and such institutions' comparative institutional properties (Lewis and Wagner, 2017; Wagner, 2012).

Indeed, as the preface and chapter 1 also suggested, the existence of both emergent properties and the core features that define organized complexity in macroeconomic reality strongly suggest that there is an entire subdiscipline and research agenda in macroeconomics that cannot possibly be—neither analytically nor methodologically—disassociated from political economy, institutional analysis, and a comparative institutional exploration of their properties. Such a novel and institutional research agenda, as delineated here, will be the main focus of attention in the following parts of this work.

Lastly, part I of this work concludes by recognizing that the foundations of macroeconomic complexity and economic knowledge ultimately reside in both orderly social (monetary) relations and specific banking institutions that define those relations. More specifically for the scope of this thesis, they reside in both money as a system of relations and the associated monetary institutions that provide, and produce, such a pecuniary medium of relations. The crucial research implication of these conclusions for macroeconomic theory, and also for the remaining four chapters, is that 'the central focus of macro-theory' naturally becomes 'the institutions in virtue of which the things conventionally regarded as

macroeconomic phenomena exist' (Lewis and Wagner, 2017, 13). Consequently, and following this research implication, part II and part III will explore and analyze the specific, and most important, banking institutions and monetary frameworks that deeply affect and guide the production and use of money in society. Hence particular attention will naturally rest upon central banks and their institutional properties.

Undoubtedly, the above research implications for macroeconomics concerning institutional analysis necessary imply and require subsequently focusing on: the crucial role of central banks within the production of money, their politically entangled evolutionary developments, and their institutional justifications (see chapters 3 and 4), and lastly on their institutional properties (or robustness) as compared to other institutional banking alternatives (see specifically chapters 5 and 6). Henceforward, part II, comprising chapters 3 and 4, will focus on the institutional rationale, crucial role, and institutional evolution of central banks within economic systems. Finally, part III, comprising chapters 5 and 6, will focus on the institutional properties (robustness) of central banks compared to non-monocentric alternatives such as free banking and NGDP targeting.

Accordingly, and building on part I, the following four remaining chapters of this work will concentrate specifically on monetary-institutional analysis. They will focus on identifying and scrutinizing the associated monetary systems of rules and banking institutions that *could* be in place in order to generate an orderly system of monetary relations and thus a stable and wealth-enhancing macroeconomic order. Consequently, since nowadays central banks are the single most important institutional feature within banking orders, part II will concentrate on scrutinizing both the institutional properties and the institutional and economic rationale behind the establishment and politically entangled evolution of central banks as an important associated system of banking rules governing the production of money.

Part II

The Institutional Rationale and Entangled Evolution of Central Banking

'I shall have failed in my purpose if I have not proved that the system of entrusting all our reserve to a single board, like that of the Bank directors, is very anomalous; that it is very dangerous; that its bad consequences, though much felt, have not been fully seen; that they have been obscured by traditional arguments and hidden in the dust of ancient controversies. . . . What would be better? . . . We are so accustomed to a system of banking, dependent for its cardinal function on a single bank, that we can hardly conceive of any other. But the natural system—that which would have sprung up if Government had let banking alone—is that of many banks of equal or not altogether unequal size. In all other trades competition brings the traders to a rough approximate equality. . . . There is no tendency to a monarchy in the cotton world; nor, where banking has been left free, is there any tendency to a monarchy in banking either'.

Walter Bagehot, 1873, 66–67

Chapter 3

The Institutional Rationale of Central Banking Reconsidered[53]

> 'In the present century centralised banking systems have come to be regarded as the usual concomitant, if not one of the conditions of the attainment of an advanced stage of economic development. The belief in the desirability of central bank organisation is universal. . . . There is, however, a noticeable lack of any systematic examination of the bases of the alleged superiority of centralised banking over its alternative. . . . Very little attention has been paid in modern economic literature to the consideration of the rationale of the particular system of banking that we have succeeded in evolving, in the light of the progress that has been made in economic science since the time when the problem was in the forefront of discussion'.
>
> Vera Smith, 1990 [1936], 3–4

Recent experiences with business cycles, such as the 2007–8 Great Recession, have led some economists to put central banking arrangements under institutional scrutiny (Boettke and Smith, 2013; 2015; Hetzel, 2012). These concerns come largely from the Great Recession and the plausible negative role that central banks might have played in it (Beckworth, 2012b; Hetzel, 2012; Sumner, 2012). Nevertheless, despite these postcrisis apprehensions, most academics and policy makers have remarkably continued to view central banking as a relatively efficient and adequate, perhaps even fundamental, institutional arrangement (Bullard, 2010; Goodhart, 2010; Hetzel, 2012).

By utilizing Goodhart's (1988) *The Evolution of Central Banks* as a theoretical motivation to start researching monetary institutions, chapters 3 and 4—which constitute part II—examine both the theoretical arguments and the historical evidence that are generally used in the banking literature to sustain the case for the 'natural emergence' of central banks as intrinsic and vital institutional solutions to banking challenges and information asymmetries (Paniagua, 2019b). Particularly, this chapter criticizes Goodhart's theoretical and historical claims that central banks must evolve naturally. I do so by showing that they are far from being institutionally and uniquely capable of supplying essential banking services and regulation. This chapter also reviews some relevant historical evidence showing that Goodhart's (1988) historical generalizations are inconsistent also with the development of the vast majority of the earlier proto–central banks established in Europe and later in the rest of the world.

Despite the Great Recession and the negative role that central banks might have played in it, most economists continue to regard central banks as the best of all possible means for managing the supply of money and our banking affairs (Bullard, 2010; Giannini, 2011; Goodhart, 2010). However, this general consensus on the institutional need for, and institutional optimality of, central banks does not rest upon a careful institutional analysis and comprehension of the actual evolution of them (Selgin, 2017). Moreover, this consensus does not rest upon a careful comparison of central banks' performances with other arrangements (Salter, 2017a). Indeed, 'the surprising truth is that most economists, including most champions of the monetary status quo . . . are only vaguely familiar with alternative arrangements, assuming that they are aware of them at all' (Selgin, 2017, ix).

[53] A modified version of this chapter was published in *Constitutional Political Economy* (Paniagua, 2017).

Undeniably, this institutional and superficial consensus about the inherent need for central banks seems to rest upon a mere leap of faith, rather than a careful institutional and historical analysis of central banks and non-monocentric alternatives (Paniagua, 2019b; Schwartz, 1993). Hence chapters 3 and 4 will concentrate on challenging this general, yet superficial, consensus on central banks, by focusing on institutional analysis and the institutional and historical evolution of central banks and by focusing subsequently also on a careful scrutiny of central banks' institutional and political-economic properties compared with those of non-monocentric arrangements (on this last issue see chapters 5 and 6 respectively).

Given the institutional consensus and apprehensions, I focus on a complementary question related to the institutional resilience and critical assessment of central banks. Whereas recent banking research has largely focused on specific monetary-policy errors or looked to improve central banks' decision-making processes (Hetzel, 2012; Sumner, 2012), I ask here unaddressed yet more fundamental research questions: Are central banks inherently necessary in the first place? And furthermore, are they necessarily the result of the banking system's natural institutional evolution?[54] The postcrisis literature lacks a specific articulation of institutional arguments that could largely justify the necessity and evolution of a non-profit-seeking, government-managed institution to oversee banking stability and regulation (Paniagua, 2019b). The contemporary postcrisis arguments for expanding central banks' supervision and macroprudential-regulatory control (Goodhart, 2010) implicitly rely on a lack of profound scrutiny concerning (a) central banks' genuine institutional necessity in the banking system and (b) the actual historical evolution of their roles and how they have developed according to political forces outside the needs of the banking systems in order to function properly (Calomiris and Haber, 2014).

Furthermore, the contemporary banking literature not only has argued for the comparative superiority of central banks, but has gone as far as to argue for their inherent institutional rationale, their unavoidable institutional necessity in a banking system, and ultimately their natural and inherent institutional evolution (Congdon 1981; Goodhart, 1987, 1988, 2010). Such institutional necessity, as the banking literature argues, stems from the preceding 'institutional vacuum' and the severe banking problems that preceded central banks and persisted within the banking system (Schwartz, 1993). Hence, the banking literature suggests that central banks have evolved naturally as an endogenous and institutional response by commercial banks to previously unmet banking challenges and informational asymmetries (Broz, 1998; Giannini, 2011; Goodhart, 1987).

Importantly, if the above arguments are accurate, then there is little scope for engaging in comparative institutional analysis of more radical and non-monocentric alternatives (see part III of this work). This is because if central banks are the natural, evolutionary, and institutionally rational response of the banking arrangements to severe banking challenges, then there is little space for proposing drastic institutional changes to them. This implicitly suggests that central banks, given their natural emergence from private banking orders, are therefore institutionally optimal or at the very least institutionally desirable. Otherwise, the argument goes, it is highly unlikely that they would have evolved endogenously and as naturally as they did from commercial and private banking (Congdon, 1981; Giannini, 2011; Goodhart, 1987, 1988). These are strong prima facie arguments favoring the institutional status quo of central banks that could potentially question, and undermine the arguments for, radical institutional arrangements that drastically seek to modify, or even eradicate, central banks. Hence given this rather

[54] I define central banks as systems in which a single banking entity has either a complete or residuary monopoly over the service of issuing notes. In contrast, the complete absence of governmental restrictions on entry and competition in note issuance and banking leads to a free-banking system. It is sensible to distinguish between the modern conception of central banks and their broader roles with proto–central banks that previously had banking privileges without any clear stability role (Dowd, 1993, chapter 11; Meltzer, 2009). Proto–central banks reluctantly adopted clearer stability roles slowly and only in the late nineteenth century; this occurred following intense public debate on their need to acknowledge lender-of-last-resort responsibilities *as palliatives* to the already-existent problem of the monopoly over issuing notes (Selgin, 1988, 119–122; Thornton, 1978 [1802]). Hence theories that treat monopoly privileges *as an evolutionary consequence* of supervisory and regulatory responsibilities distort actual historical sequences.

superficial consensus about the natural evolution of central banks, part II will focus on scrutinizing those prima facie arguments in order to challenge macroeconomists' general consensus on the inherent need for, and natural evolution of, central banking.

Hence contrary to the aforementioned claims, in part II I argue for a broader institutional rationale for, and for the possibility of adopting, heterogeneous, adaptive, and more diverse institutional structures that can overcome severe banking challenges without necessarily centralizing the monetary system in a single structure, such as a central bank (see also Paniagua, 2019b). Goodhart's (1988) narrow institutional arguments in favor of establishing central banks are shown in this chapter to be actually broader arguments in favor of encouraging broad institutional diversity and polycentricity in banking, much aligned with the Ostromian paradigm of institutional diversity and self-governance (E. Ostrom, 2005, 2010).

Thus chapters 3 and 4 provide theoretical and historical arguments in favor of a broader type of banking institutional diversity, much in line with the Ostromian paradigm of polycentric-contestable institutional structures in banking (Paniagua, 2019b; Salter and Tarko, 2018). These chapters then argue, contra Goodhart and others (see Congdon, 1981 and Giannini, 2011), that there is not a general and inherent theoretical justification for adopting central banks as a single one-size-fits-all institutional solution to severe banking challenges. Indeed, I argue for the need of institutional diversity and polycentricity in banking in order to promote sustainable banking stability (see also Paniagua, 2019b).

Furthermore, the banking history briefly reviewed here additionally shows that crucial banking services and financial regulation have tended to be successfully provided by polycentric and decentralized means—except when governments prevented or hindered their development (Bagehot, 1873; Goodspeed, 2016; see sections 3.1 and 3.2). This brief historical analysis, and the exploration in this chapter of key historical evidence concerning institutional evolution within banking, will be further developed in chapter 4.[55] Finally, chapter 3 considers whether central banks, if not essential, are at least preferable to polycentric and cooperative arrangements such as contestable clearinghouses. This chapter then also conducts a brief exercise in comparative institutional analysis (see section 3.3) to compare the relative institutional robustness of central banking and a polycentric system of contestable clearinghouses. This exercise will be further developed and extended to the realms of monetary policy and monetary-policy rules throughout chapters 5 and 6 (see also Salter, 2017a).

Consequently, the purpose of this chapter is twofold. First, it scrutinizes Goodhart's (1988) institutional rationale for the emergence of central banks as the natural and intrinsic outcome of banking systems' regular processes of economies of reserve holding (economies of scale in reserve holding, see sections 3.1 and 3.2); second, it pursues a comparative institutional analysis of contestable clearinghouses and central banking (section 3.3). Since Congdon's (1981) and Goodhart's (1988) arguments rest on both history and theory, it is imperative to address them separately. The historical evidence shows that Goodhart's evolutionary generalizations are inconsistent with the historical developments of the vast majority of proto–central banks (see section 3.1). History shows that central banks were established not because of a natural banking evolution, but instead because of fiscal forces, international political pressure, and government sovereignty (Marcussen, 2005; see also chapter 4).

Similarly, theoretical considerations suggest that Goodhart's (1987, 1988) narrow rationale for the natural emergence of central banks is misplaced. In fact, arguments from club theory and E. Ostrom's (1990,

[55] As key historical evidence of these institutional and evolutionary arguments, part II—particularly chapter 4—explores in depth the paradigmatic historical case of the institutional evolution of the Bank of England in order to show that central banks' *apparent* natural institutional evolution can more coherently be described, in general terms, by political processes and economic-political bargains between interest groups and the sovereign. These politically entangled processes are, for instance, political bank bargains and political entanglement dynamics in which some proto–private commercial banks *acquire* political, nonmarket, and uncompetitive characteristics over time, in exchange for credit and banking benefits for the sovereign. See more details of these political and economic institutional processes and banking evolution in chapter 4.

2010) insights on institutional diversity and self-governance sustain arguments for a *wide spectrum* of non-monocentric institutional possibilities and institutional creativity perfectly capable also of supplying crucial banking services and banking self-governance (see section 3.2; Paniagua, 2019b). Moreover, by borrowing from Buchanan's contributions to constitutional political economy and the theory of clubs (Buchanan, 1964, 1965, 2008, 2010), I examine the institutional evolution of banking systems to see whether their properties can justify the natural centralization of reserves in a single nonprofit bankers' bank or whether instead they justify a wider set of institutional responses. Contrary to Goodhart and others, E. Ostrom's work on self-governance and Buchanan's club theory suggest that the institutional evolution of banking *does not* necessarily lead to a single bankers' bank nor to monocentric solutions to crucial banking challenges.

The chapter proceeds as follows: Section 3.1 examines the core 'micro (regulatory) functions' undertaken by central banks and proposed by Goodhart (1987, 1988), and it examines some relevant historical developments in both central banks and bankers' banks that could challenge his historical generalizations. Particularly, the first section analyzes three crucial historical banking cases and considers evidence concerning the political development and diffusion of earlier, proto–central banks in Europe and later in the rest of the world. This historical analysis, undertaken throughout section 3.1, will be further developed in the following chapter, with a particular focus on the Bank of England. Section 3.2 explores Goodhart's (1988) theoretical arguments concerning the inherent need for central banks and also explores the theoretical and historical aspects in favor of different institutional developments and the evolution of heterogeneous institutional banking alternatives conditioned by the legal framework.

Later in this chapter, section 3.3 undertakes a brief comparative institutional analysis of contestable, non-monocentric clearinghouses (or banking clubs) and central banking. This is to see whether central banks, if not essential, can still be justified and preferred when compared with possible decentralized alternatives.[56] Central banks may not be the natural result of the institutional evolution of banking—as argued in sections 3.1 and 3.2—but comparatively speaking they could still be superior to non-monocentric institutional alternatives. For this comparative analysis, section 3.3 draws on E. Ostrom's work on self-governance and Buchanan's club theory to see whether alternative forms of clearinghouses or club arrangements might prove more resilient institutionally than central banks in providing the crucial micro-regulatory functions.[57] Section 3.4 concludes.

3.1 A Historical Account of Centralization of Reserves

Although economists more frequently talk about the monetary-policy aspects of central banks, it is often noted that they could be justifiable or even necessary instead because they could generate additional confidence in the banking system in times of crisis. Central banks could accomplish this by providing liquidity, leadership, regulation, and surveillance of the banking members (Goodhart, 1988, 44–47). Goodhart acknowledges that while the monetary-policy roles of central banks have changed drastically through time, there are some functions that have remained unaltered. These roles include ensuring financial stability, supervising banks, and mitigating banking crises through regulation and liquidity. Goodhart defines these roles as 'micro functions' of central banking.[58] He maintains that 'the monetary (macro) functions of Central Banks were largely grafted onto the supervisory functions, and not the reverse . . .[this] implies that the central core and rationale for the existence and operation of a Central Bank is not necessarily to be found in its macro-economic role' (Goodhart, 1988, 7).

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[56] Clearinghouses are voluntary associations with the main functions of clearing notes, drafts, checks, and bills of exchange and regulating the club members (Goodhart, 1988, chapter 3). These services are only accessible to club members. See also Paniagua (2019b), Timberlake (1984, 2014) and Trivoli (1979).

[57] For contributions to club theory and institutional self-governance, see Buchanan (1965), Ostrom (1990, 2000, 2010) and Tiebout (1956).

[58] I use Goodhart's (1988) 'micro functions' concept throughout the rest of this work to refer to a *bundle of banking services* related to financial and banking supervision, bank regulation, and the role of lender of last resort (see also Paniagua, 2019b).

Consequently, Goodhart (1987, 1988) believes that the core justification of central banking rests on these micro (regulatory) functions, consisting of providing a central and efficient source of reserves and liquidity to banks and therefore proper insurance and constant monitoring and regulation of them. He ultimately establishes that these micro functions justify the institutional evolution of central banks since these functions *arise naturally* as the consequence of a gradual centralization of reserves into the control of a single entity in the whole banking system (Goodhart, 1988). The tendency for such a concentration of reserves (economies of scale in reserve holding) puts the entity that receives the banks' reserves in the unintended (and fragile) position of being a for-profit 'bankers' bank'; in addition to competing with other banks, a bankers' bank must also serve as the ultimate source of liquidity and support for banking competitors. Thereafter, in order to perform that 'liquidity support' role, it also must assume complementary supervisory, monitoring, and regulatory functions (Goodhart, 1988, 7–8).

This natural process of concentrating reserves into a single competitive bank is the foundation of Goodhart's justification for a *noncompetitive* central bank and hence its rationale (Goodhart, 1988, 5, 34, 37, 73; Selgin, 1993). Subsequently, Goodhart seeks to further support his thesis on historical grounds; he analyzes mainly two historical episodes from which he subsequently generalizes his institutional conclusions. He reviews the evolution of the Bank of England and the Suffolk experience, episodes I review in subsections 3.1.2 and 3.1.3, respectively. Goodhart's core assumption concerning how the institutional process of concentration of reserves causes the micro functions to arise rests on his claim that the natural competitive banking forces *inevitably lead* to the concentration of 'bank balances among a few, central, well-established commercial banks, in some cases one or two banks' (Goodhart, 1988, 34). This allows those special bankers' banks to become the systems' main holders of reserves and the ultimate source of liquidity to the rest of the system.

From their unique role as the ultimate liquidity providers and holders of reserves, they necessarily have to develop supervisory and regulatory functions over other banks. Consequently, the natural concentration of reserves of the entire system into a single for-profit bank worsens bank runs and liquidity issues. This is due to the contradiction of those banking institutions: being the bankers' bank while simultaneously being a for-profit competitive entity. The contradiction and the strong for-profit motive lead bankers' banks to mishandle crises and act inconsistently with the public interest (Bagehot, 1873). Such banking behavior stems from trying to profit from and leverage their preferred position to overload other competitive banks with unnecessary regulation or even potentially use discretion to make them fail in case of liquidity constraints (Bagehot, 1873; Goodhart, 1988, 38–39).

The institutional progression then has to conclude with the natural creation of a central bank to establish a *nonprofit structure*. The nonprofit nature of the central bank enables it to escape the fear of draining reserves and thereby losing profitability (since it is not among its public functions) and therefore able to fully address the public interest (the core micro function) with strong leadership (Goodhart, 1988, 45–46). In sum, Goodhart's rationale for central banks rests on two elements: first, their natural institutional role as a major (or the only) accumulator of reserves; second, their ability to monitor, regulate, and provide liquidity (the micro functions) while escaping any conflicts of interest (Goodhart, 1988, 37–39, 53–55). Concerning the following historical evidence that could support or refute the aforementioned thesis, the fundamental question I address is whether centralized institutions have indeed evolved throughout history as Goodhart suggests.

3.1.1 The diffusion of central banks

Goodhart's (1988) historical arguments rest mainly on his interpretation of the development of the Bank of England and the Suffolk system (cases I later review). However, it is never prudent to draw generalized institutional conclusions based on such a narrow set of historical experiences. Goodhart's historical conclusions, supported by merely two cases, seem to be hasty and unsubstantiated. After all, the history of the establishment of central banks is a matter of a much wider historical record (Singleton, 2011).

There is considerable historical evidence that challenges Goodhart's historical proposition, supporting instead a broader fiscal- and political-origins interpretation.

Concerning the proto–central banks (see footnote 32) established in Europe before the twentieth century, Smith (1990 [1936]) provides historical evidence that proto–central banks around Europe were established because of governments' financial and fiscal considerations. Proto–central banks originated in the necessity of sovereigns to have access to better terms for their long-term financing efforts, to raise money for their governments, and to have expedient access to credit on demand (Broz, 1998, 234–236). They were specifically established as a type of banker for the government with the objectives to become exclusive managers and fiscal agents with respect to governments' debt and to provide institutional solutions to improve governments' damaged creditworthiness (Broz, 1998). Their establishment consisted of political-economic relationships in which those banks benefited from unique legal and banking privileges; their role also involved financial activities to improve states' ability to borrow in order to further their international objectives, specifically those related to military competition and colonization (Calomiris and Haber, 2014).

According to Broz (1998) and Glasner (1989, chapter 2), national defense and war uncertainty largely contributed to the establishment of earlier proto–central banks and to the ever-increasing control of monarchs over coinage. Proto–central banks were conceived as state-led institutional answers to improve governments' abilities to borrow and to quickly mobilize resources during wartime (Broz, 1998, 236–239; Calomiris and Haber, 2014). Unpredictable war-financing distress led sovereigns to gradually expand their control over both coinage and the banking system as expedient and cost-effective ways to obtain revenue during unforeseen emergencies (Glasner, 1989, 29–32).

Selgin and White (1999) also show that the organization of money production evolves institutionally as an unintended product of the gradual accumulation of tax- and revenue-enhancing innovations by sovereigns attempting to maximize government revenue. Governments in fact have not consciously designed monetary arrangements from scratch in order to attain fiscal ends. Nevertheless, their circumstantial fiscal needs and the 'gradual accretion of revenue-enhancing changes' in the banking system through time have severely and unintendedly shaped them (Selgin and White, 1999, 164). Fiscal motivations to provide themselves with seigniorage and recurrent favorable terms in credit financing have led governments to control the supply of currency. Thus 'revenue-seeking governments have opportunistically modified private-market arrangements as these developed' (Selgin and White, 1999, 155). Thus national security and fiscal forces, *not* natural reserve dynamics, have severely shaped the institutions of money and their structures toward revenue- and seigniorage-enhancing institutions such as monopoly banks of issue (central banks).

Additional historical examples that provide evidence contrary to Goodhart's natural-evolutionary arguments concern the unusual and sudden increase in the establishment of central banks throughout the twentieth century. The total number of central banks grew exponentially from 19 in 1900 to 174 by 2000 (Marcussen, 2005; Singleton, 2011). Interestingly, the sudden growth over the century took place in waves or successive specific periods of large increases in establishments. Their growth reflected consecutive but different patterns of international diffusion rather than an endogenous natural banking evolution (Marcussen, 2005). After World War I, the majority of the newly established central banks were founded as part of successive institutional 'waves' that answered to different 'diffusion mechanisms' frequently related to international politics and government sovereignty (Clay, 1957; Sayers, 1976). Thus the establishment of central banks responded to the role of ideas, nationalistic ambitions, and international political pressure as major drivers of their international growth (Jácome, 2015; Marcussen, 2005). These different mechanisms of diffusion that explain the establishment of central banks are historical facts at odds with Goodhart's natural historical claims.

For example, by the end of World War I, there were twenty-five central banks (Marcussen, 2005). After

the war, active international coordinative efforts were led by Montague Norman and Benjamin Strong and consolidated at the Brussels and Genoa Conferences; the number of central banks increased substantially to forty (Clay, 1957; Jácome, 2015). During the 1920s, cooperation between Norman and Strong helped financial and monetary reconstruction around Europe (Einzig, 1932). Norman and Strong, true believers in international postwar cooperation guided by central banks (Clay, 1957), framed their international-cooperation program early in the 1920 League of Nations meeting. There, 'with a remarkably broad consensus it was agreed to call for every country to have a central bank' (Marcussen, 2005, 912). Because of this campaign and the international difficulties with reconstructing the gold standard, governments were convinced to establish new central banks and to join the international collaboration to build a postwar monetary order (Einzig, 1932; Singleton, 2011).

Similar dynamics also occurred in Latin America and in the British Dominions during the interwar period (Jácome, 2015; Sayers, 1976). These international dynamics could hardly be considered a natural institutional development inherent to banking. Of today's central banks, twenty-one were established during these interwar political international efforts (Marcussen, 2005). This suggests that central banks' international experiences throughout the twentieth century responded to diverse motives such as international politics and the role of ideas (Clay, 1957; Sayers, 1976).

The above is further supported by the unusual growth of newly established central banks during the postcolonial wave in which their numbers increased by 75 percent in response to new sovereignty needs to project 'a sign of statehood' by former colonies gaining political independence (Marcussen, 2005, 914–915). These diverse mechanisms for the diffusion of central banks cannot be said to respond to endogenous and natural dynamics inherent in banking. The fact that central banks were established to respond to different political and nationalistic diffusion mechanisms is crucial historical evidence demonstrating that Goodhart's (1988) claims are inconsistent with how the vast majority of central banks actually developed.

3.1.2 The Bank of England

Goodhart's (1988) historical generalizations in his evolutionary account of central banks seem unwarranted, at least when considering the wider trends of their establishment. In addition, the two relevant and specific cases he reviews in *The Evolution of Central Banks* can be used to contest his historical claims. While I grant Goodhart's argument true concerning the natural tendency toward the concentration of reserves in banking or real economies of scale in reserve holding (see also Selgin, 1993), it *does not* logically entail an almost-complete concentration of reserves in one competitive bank. The tendency toward a severe and unique concentration can only be understood once we fully acknowledge the legal-regulatory and market framework in which those banks make their choices and to which they adapt their institutions accordingly. Monopoly powers and legal restrictions in banking severely guide the institutional evolution from a decentralized banking system (in which banks hold their own reserves) toward a centralized and monocentric system (Bagehot, 1783; Selgin, 2010).

As Bagehot (1873) recognized, the evolution of the Bank of England is a crucial historical example in which this tendency exists in the context of growing banking privileges and legislation.[59] After the establishment of the Bank in 1694, it received several special legal privileges and monopoly powers at the time of each renewal of its bank charter (Broz, 1998; Smith, 1990 [1936]). Those early privileges were a monopoly on keeping government balances, a monopoly on chartered banking, and an exclusive

[59] This historical example of political entanglement and institutional evolution will be further explored in the following chapter. Given the Bank of England's institutional and historical importance, and given the use of its history and establishment as a main institutional justification for central banks throughout the banking literature (Goodhart, 1988), similar to Bagehot (1873) I consider that this specific case requires a chapter of its own in order to further clarify some important historical claims. Thus see more details of this historical case in the following chapter.

limited-liability status (this last privilege lasted one and a half centuries), among others.[60] Subsequently in 1708 the Bank's charter was renewed. The bank Act specified that 'no firms of more than six partners might issue notes payable at demand or at any time less than six months' (Smith, 1990 [1936], 13). This effectively excluded joint-stock firms from the business of issuing notes and hence from the banking business, establishing a monopoly over joint-stock notes issue that lasted till 1826 (Broz, 1998; Selgin, 1988, 6). Through time, the legal restrictions and privileges changed according to the bargaining powers of the government and the Bank (Broz, 1998).[61]

More importantly for the concentration of reserves, the Bank's monopoly over London's note-issuance business remained unaltered for an extensive period (Broz, 1998; Calomiris and Haber, 2014, 85). Regarding the dynamics of concentration of the reserves of the banks in England, the key factor was then *precisely* the fact that, in practice, the Bank had a statutory monopoly of note issue in the greater London area. This compelled other banks to treat its notes, and therefore its deposit liabilities, as cash reserves, superior to gold itself. Because of the Bank's London monopoly, other London banks had to rely on their reserves of Bank notes to meet depositors' currency requirements (Selgin, 1988, 119). London banks were not allowed to meet the public's changes in their relative demand for currency.

This compelled them to rely on Bank of England notes to meet increases in the demand for currency, leading the Bank's notes to unintendedly occupy a privileged position in banks' portfolios. Thus 'the extraordinary demand for currency in London could only result in an extraordinary demand for Bank of England notes' (Selgin, 1988, 120; see also Thornton, 1978 [1802]). The Bank's monopolist note-issuing position compelled other banks to use the Bank of England's notes as their cash reserves and to keep balances and gold reserves with it, which caused the English system's reserves to gradually, but persistently, concentrate (Broz, 1998).

The incentives to concentrate reserves in the Bank of England were further exacerbated when English banks had the certainty (given by law or judicial precedents) that the special bank holding their reserves would under all circumstances be able to give out those reserves in a medium that would be accepted by the public at all times. This is exactly the case with a bankers' bank whose notes are (or become) legal tender or that has suspended payment on its notes (Smith, 1990 [1936]).[62] Banks further had the incentive to choose to concentrate their reserves in a competitor bankers' bank since it was to their economic benefit to do so, given the Bank of England's unique monopolist and political status and given the exclusive (de facto) legal status of its notes (Bagehot, 1873; Broz, 1998).

With a centralized institution as the sole supplier of currency in London that was able to secure and to provide the reserve medium—since it had the monopoly powers to do so—it was perfectly natural (given banks' limitations on issuing notes) for a banking system to concentrate cash reserves and gold reserves in that single entity (Dowd, 1993). This, however, follows from the *prior* existence of the monopoly of note issue, the legal powers granted by the government, and the subsequent legal precedents on the suspension of payments of the Bank's notes, which further altered and exacerbated the institutional dynamics of the concentration of reserves.
The concentration of bank reserves was therefore guided mainly by the Bank's monopoly of note issue and later reinforced by legal precedents that ensured that the Bank and its notes were supported politically

[60] For a review of the Bank's evolution of its privileges and charters, see Broz (1998). See also chapter 4, and the literature cited therein.
[61] The evolution of the Bank responded to England's war efforts rather than natural banking developments. The government reacted to spikes in military spending by renegotiating charter renewals. Since negotiations were within the context of war pressures, they tended to secure increasing monopoly powers to the Bank, leading to an *unnatural* central position in England (Broz, 1998).
[62] In 1797 an act of Parliament allowed the suspension of payment of Bank notes, legalizing the capacity of bankruptcy of the Bank. This created a crucial legal precedent in which competitive banks started to expect the government to act in this way, giving a *special status* to Bank notes. This was further reinforced when the government declared them explicit legal tender (Dowd, 1993).

and by law. These privileges and legislations guaranteed that its notes would be accepted in the country, changing the incentives of the competitor commercial banks to seek Bank notes to back their own notes. The suspension period between 1797 and 1811 further contributed to enhancing the political status of the Bank's notes (Dowd, 1993). Additionally, in 1833 the government declared Bank of England notes legal tender for all payments, with severe additional institutional implications, since 'country banks began to look on them [Bank notes] as backing their own note issues' (Smith, 1990 [1936], 16).

Essentially, the legal tender status of Bank of England notes had additional institutional implications for the concentration of reserves; but it was mainly by *reinforcing* the 'centripetal forces' and tendencies already present because of the initial unusual situation in which the Bank had a monopoly of note issue. By the time the legal tender status of the Bank's notes was established, the treatment of its balances and notes as cash reserves was already established as a result of its monopoly of London circulation (Selgin, 1988, 6). Nevertheless, the government's credible commitment to ensuring that Bank notes would always be accepted as legal payments because of their inconvertibility and legal tender status further assured other commercial banks of the superior status of Bank of England notes. Thus these unique legal precedents and the Bank's monopoly of note issue generated a sort of Gresham's-law effect in the English system in which individual banks concentrated gold and cash reserves and started using Bank of England notes as their reserves instead (Dowd, 1993).

This unusual process of drastically concentrating reserves stands opposite to what would happen under an institutional arrangement in which no bank is given monopoly status over note issuance and its notes made quasi–legal tender (Selgin, 1988). As Bagehot (1873) noticed, this concentration of reserves is not the natural outcome of all banking systems, but was in this case rather the logical conclusion of a gradual accumulation of special economic and political powers given to the Bank of England (see also Smith 1990 [1936]). The monopoly powers and legal precedents aforementioned radically shaped the framework and incentives that other commercial banks faced, compelling them to prefer Bank notes as their main reserves rather than seeking other institutional alternatives (such as bank branches and banking networks) to guide the reserves' centripetal forces (centralizing economies of scale in reserve holding). Consequently, Goodhart's first historical example does not actually support a generalized natural institutional evolution of central banks (see also chapter 4).

3.1.3 The Suffolk experience

Goodhart (1987, 1988) uses the Suffolk Bank experience as his second historical example to attempt to show how the evolutionary tendencies of banking *inevitably* lead to the concentration of reserves in a single bank and how this concentration process can occur *without* the unique bank necessarily having special privileges. He uses the Suffolk case to sustain the claim that a quasi central bank can naturally emerge from competitive forces and the voluntary association of competing members and to justify as necessary the institutional transition toward and rationale for a central bank.[63] Bankers' banks similar to those in the Suffolk experience (Goodhart, 1988, chapter 3) are sometimes considered to behave as *quasi* central banks, which differ from voluntary clearinghouses since the quasi central bank providing the service is still a single, competitive, and for-profit commercial bank, and not a voluntary club association (Smith, 1990 [1936]).

This for-profit and competitive quasi central banking structure (bankers' bank) raises a clear conflict of interest and creates perverse incentives, leading bankers'-bank systems to become dysfunctional because the bankers' banks are incapable of impartially dealing with a 'public' function while being for-profit competitive entities (Bagehot, 1873; Goodhart, 1988, 38–43). Nevertheless, defining a bankers' bank such as the Suffolk Bank as a *quasi* central bank is actually misleading. Unlike central banks, the Suffolk system

[63] For a comprehensive review of the Suffolk Bank, see Lake (1947) and Trivoli (1979). Also see the stability and self-governing (self-enforcing) properties of the Suffolk banking system in Calomiris and Kahn (1996) and Salter (2018).

did not possess a legal monopoly of note issue, and thus rival banks did not use the Suffolk Bank's liabilities as high-powered money (Lake, 1947, 191; Salter, 2018).

It is critical to emphasize the legal and market context and the institutional framework within which the Suffolk bankers' bank was allowed to emerge. When the Suffolk system was established in Boston in 1819, the United States had a banking system of *decentralization without freedom*, due in large part to special legal limitations in chartering (bank branches) and restrictions on deposit banking and note issuance circumscribed under specific state laws (Calomiris and Kahn, 1996; Dowd, 1993). Of crucial importance in this case was the prohibition of branch banking, which 'slowed the evolution of an efficient system of note exchange and clearing, thwarting normal competitive checks against overissue' (Selgin, 1988, 14). The result of prohibiting branch banking in the US was the institutional formation of a unit-banking system that was highly fragmented, fragile, and dispersed (Calomiris and Kahn, 1996).

This fragmented banking context hindered the development of both an expedient system of note exchange and strong institutional checks against banks' overissue. This created the conditions by which notes needed to travel large distances to be redeemed by other banks, creating serious time-lag problems for clearing and incentives to overissue (Lake, 1947; Smith, 1990 [1936]). The time lags between note issuance and redemption created the economic incentives for country banks to issue larger volumes of notes as long as the chances of their being presented for redemption were small. This was exacerbated for geographical reasons and by states' restrictions on branch banking, which incentivized country banks to issue large amounts of notes by placing themselves in remote areas away from large city centers.

The above allowed, for example, country banks in Massachusetts to attempt to free ride on the clearing and circulation of their own notes by moving as far away as possible from Boston, attempting to overissue notes in the city (Smith, 1990 [1936], 49). Thus country banks in Massachusetts increased their volume of notes in circulation in Boston because of that institutional and redemption lag. Branch-banking restrictions made it particularly difficult for Boston banks to redeem out-of-town ('country') banks' notes expediently and to counter their circulation and overissue in Boston (Dowd, 1994).

The Suffolk system was therefore the private institutional reaction to the branching prohibition and the geographic and legal context in order to form a collective response by city banks against country banks' note circulation in Boston and their risk of overissue (Calomiris and Kahn, 1996). The formation of the Suffolk was meant to deal with those large volumes of country banks' notes that remained in circulation in Boston with 'the intended effect of curtailing circulation of the country banks' (Smith, 1990 [1936], 49). Hence the Suffolk was actually *not* the result of the banking system's inherent natural forces to concentrate itself (Calomiris and Kahn, 1996). The Suffolk could actually be seen as an endogenous response—given branching restrictions—to the inefficient note-exchange and clearing system, which was frequently unable to return notes to its issuers and incapable of maintaining checks against overissue (severe time lags between issuance and redemption). Problems largely originated in prohibitions of branch banking in the first place (Selgin, 1988, 14).

Additionally, states' charter regulations and limitations (although Massachusetts's were among the least strict) raised severe barriers to entry and costs of establishing new competing or contestable 'bankers' clubs' (Lake, 1947). Other groups of banks were constrained from forming their own competitive clearinghouses without strict hierarchical and coercive arrangements, severely weakening clearinghouse competition. Stiffer branch-banking restrictions and states' charter regulations led banks to rely not on voluntary association, but rather on bankers'-bank arrangements with much broader and more authoritative regulatory powers over their members. Thus the Suffolk Bank operated with overly constraining rules, shifting operating costs and risk to its members, while also giving them a 'high-handed attitude' (Calomiris and Kahn, 1996; Dowd, 1994, 295). Suffolk members' discontent incentivized them to try to establish another competitive and more horizontal banking club. However, states' charter restrictions and political opposition by the legislature made the entry and establishment of such

competitive and more cooperative clubs excessively difficult (Lake, 1947, 193–196).

Nevertheless, after several attempts to obtain a charter, the rival Bank of Mutual Redemption (BMR) was established in 1855, which offered clearinghouse and banking services on much better terms and was less hierarchical than the Suffolk system (Calomiris and Kahn, 1996). The crucial institutional difference between the BMR system and the Suffolk system is that the former was an *actual* voluntary bankers'-club arrangement, in which the BMR was owned by its bank customers rather than a direct commercial bank competitor or a bankers' bank such as the Suffolk (Lake, 1947, 196).

Hence the BMR had the structure of a competitive and voluntary bankers' club, which avoided the conflicts of interest, coercion, and over-regulation of its members (Dowd, 1994, 296). The fact that Suffolk clients defected to the BMR and the Suffolk eventually abandoned the market for banking services and clearing indicates commercial banks' actual preferences for a much more limited, more cooperative, and less hierarchical bundle of services (Dowd, 1994, 296; Lake, 1947). More importantly, the fact that banks *opted out* of a hierarchical bankers' bank for an actual cooperative bankers'-club arrangement is crucial historical evidence that further disputes Goodhart's historical claims. Hence this example shows that competitive clearinghouses were in fact not only successful and feasible institutional solutions (whenever allowed) but also preferable to hierarchical bankers' banks to provide the bundle of services that banks actually desired.

Hence it is not at all evident that without restrictions on branch banking, charter procedures, and legal restrictions against entry, the dynamics of banking and reserves would have naturally tended to form something like the Suffolk system (Calomiris and Kahn, 1996). What this experience actually demonstrates is that the natural tendencies to centralize reserves were—in this specific case—guided by the regulatory framework that severely restricted chartering, competition, and branching. Thus the centripetal forces of reserves concentration and the need for expedient clearing, guided by branch-banking restrictions, *temporarily* led a for-profit bank to act as a bankers' bank until club competition could arise. Accordingly, this legally-conditioned case does not justify Goodhart's generalization claiming that the natural tendencies of reserves (economies of scale in reserve holding) and clearing will inevitably lead to a bankers' bank that will transition toward a central bank.

3.1.4 Voluntary clearinghouses and branch banking

Additional historical evidence also shows that institutional frameworks that *did not* institute rigid banking legislations and restrictions over branch banking experienced entirely different institutional manifestations of the dynamics of reserves and clearing. Most of them have actually led to institutional arrangements predominantly decentralized and self-governing in order to provide crucial banking services. Indeed, there are several documented historical episodes of relatively successful institutional banking arrangements, largely based on branch banking, bilateral clearing arrangements, and voluntary clearinghouses, whenever freedom of competition and branching existed (Calomiris and Haber, 2014; Dowd, 1992; Goodspeed, 2016; Schuler, 1992).

For example, during the 'free banking' antebellum period in the United States, different regions established private clearinghouses that helped their banking systems to clear banks' rival notes, check their overissue, increase 'netting economies' of interbank dues, and regulate their members (Dowd, 1993, chapter 8; Timberlake, 1984).[64] During this period, banks started to use these institutions voluntarily not only as clearinghouses but also to coordinate private lending by keeping part of their reserves as deposits with them (Dowd, 1994; Timberlake, 1984). This allowed clearinghouses to adopt certain functionalities, particularly the supervision and private regulation of their members, evaluating applicants' financial

[64] Before the establishment of the Fed in 1913, the US banking system was *far* from competitive in its branching, which could make the US case somewhat misleading. The regulatory framework that prohibited branch banking across state lines led to the formation of far more centralized, less competitive, and more autocratic clearinghouses (Dowd, 1992).

integrity, and coordinating lending in the event of liquidity constraints (Salter and Tarko, 2018).

The crucial characteristic of clearinghouses is that they successfully provided the central banks' micro functions *competitively*. Unlike central banks, they competed without having monopoly over note issuance or any other specific legal or banking privilege (Dowd, 1994). In addition to clearinghouses, in institutional settings that largely allowed competitive branch banking to develop (as was the case in Canada and Scotland), the natural tendencies for the concentration of reserves led *primarily* to private branch-banking networks (Dowd, 1992, 1993; Schuler, 1992; White, 1984). Those private banking networks were often and later either accompanied by bilateral informal agreements to clear notes or voluntary associations of clearinghouses in order to coordinate and reduce the need for overall reserves (Dowd, 1993; Schuler, 1992).

It is worth noting that the institutional possibility of bank branching and banking networks is a crucial aspect of credit efficiency, economies of scale, banking stability, and netting economies of interbank dues (Calomiris and Haber, 2014; Calomiris and Kahn, 1996). In fact, historical evidence suggests that banks largely seek to rely on branch banking and networks and treat it not as an alternative to but as a *key complement* to bilateral agreements, clearinghouses, or bankers' banks (Dowd, 1994; Schuler, 1992). Building a vast network of branches allows interbank clearing and settlements to occur at the local level, avoiding unnecessary management and transactions costs of clearing and settling solely in one central location, thus severely reducing also time lags between issuance and redemption.

Branch banking is crucial to reap economies of scale and netting economies (Calomiris and Kahn, 1996). In fact, in legal contexts dominated by contestability and competition among few banks and with freedom of branching, the institutional evolution leaned toward wider branching networks and cheaper bilateral clearing arrangements (White, 1984). Thus clearinghouses and bankers' banks become far less relevant, or perhaps even unnecessary, for banking systems to work properly and efficiently (Dowd, 1992, 1994; Schuler, 1992).[65]

For example, during its free-banking period, Canada largely allowed competition and branch banking. This created the conditions for the banking system to function properly *largely* on the basis of private branching networks and informal bilateral clearing arrangements. Banks' private branching networks can attain economies of scale comparable to other arrangements, up to a point, making more complex and costly centralized institutions less necessary (Dowd, 1994; Schuler, 1992).[66] The Canadian experience and that of others around the world (Dowd, 1992; White, 1984) show in fact that private institutional solutions are possible, *contrary* to Goodhart's generalizations in which small, independent bank units will always seek 'quasi-Central Banking functions' in a competitor (Goodhart, 1988, 34–38).

In contrast, some countries such as the aforementioned US had stiffer branch-banking restrictions and far more regulation for banks' charters and operations. The institutional tendencies led instead toward establishing more complex and formal multilateral clearing arrangements, which exercised greater regulatory powers over their members (Dowd, 1994, 298). These systems relied on stronger and more-controlling clearinghouses, but not by granting a privileged unique position to any competing bank. They

[65] In a free banking context, the emergence of clearinghouses might not even be that necessary. This holds true in cases in which the cost of instituting an overseer of interbank lending outweighs the benefits of going to a decentralized market. In systems with few banks, the netting economies of interbank settlement can be reaped solely through branching and bilateral agreements, which require much less coordination and collective action (Dowd, 1992; Schuler, 1992).

[66] The benefits of the convergence (centralization) of reserves stems from economic efficiency. Considerations include economies of scale, risk diversification, lack of branches in a given geographical sector, and simplification of interbank payments (Dowd, 1994). The economies of scale achieved through centralizing reserves mainly come from netting and clearing economies. Banks that park reserves in a single bankers' club can achieve expedient and cost-efficient 'netting out' of interbank dues prior to settlement. Importantly, those economies of scale could actually be reaped without any strong centralization of the settlement medium in a single overarching bank. However, some degree of voluntary centralization does offer economic and managerial benefits by largely reducing the settlement transaction costs.

usually formed strong 'club associations' that then developed more-hierarchical banking and regulatory services (Dowd, 1994; Timberlake, 1984).

These different levels of centralization and hierarchical institutional differences in historical cases indicate a direct institutional-legal relationship between clearinghouses' degree of hierarchy, coercion, and regulatory powers and existent banking legal restrictions over branching and competition (Dowd, 1994, 295–297). In fact, whenever banks experienced considerable freedom to cooperate, compete, and branch, the institutional evolution leaned *away* from hierarchical bankers' banks and 'strong clubs', leaning instead toward a combination of private branch banking, bilateral clearing agreements, and possibly some voluntary and more complex associations or clubs (Calomiris and Haber, 2014; Dowd, 1992; White, 1984).

All these different cooperative systems or institutional possibilities show a broader range of alternative and plausible private institutional formations in banking and of successful combinations of them. The evidence of both successful private institutional heterogeneity and diversity in banking systems again disputes Goodhart's (1988) narrow historical claims. Moreover, history further disputes Goodhart's monocentric evolutionary thesis by showing that crucial banking services have been successfully provided by *other* voluntary and polycentric institutional means (Goodspeed, 2016; Paniagua, 2019b). This conclusion has important and broader constitutional and legal implications. It suggests that the existence of branching restrictions, the degree of market competition allowed, and the rule of law that governs banking interactions and defines banks' property rights have been crucial in shaping the evolution and the structures of banking cooperation. Therefore, the broader constitutional framework of banking and its rules for controlling cooperation and competition have severely determined and limited how banks can plausibly create scale economies and promote cooperative non-monocentric arrangements in order to supply central banks' micro functions.

As suggested throughout this section, there will always be an institutional tendency for banks to allocate and concentrate their reserves (the centripetal forces) and to seek interbank lending and clearing arrangements whenever possible to economize resources, reap economies of scale, and to minimize operational risk (Schuler, 1992; Selgin, 1993). As argued, this tendency could also lead to branching networks or other private formations and diverse institutional combinations that could provide the required services in accordance with the given context of incentives and legal precedents (Calomiris and Haber, 2014). The constitutional context and regulatory regime in which banks function severely shape how clearing, netting, and the economies of holding reserves operate institutionally; they also constrain how voluntary collective action among banks could potentially internalize and provide crucial banking services (Bagehot, 1873; Smith, 1990 [1936]).[67]

Therefore, the intrinsic and common existence of Goodhart's general centripetal forces (which drive and incentivize banks to seek to economize reserves, converge, and create netting economies) should not be confused with those more narrow *specific* and *contextualized* banking tendencies in given constitutional and more restrictive legal contexts. Consequently, Goodhart's (1987, 1988) historical generalization of central banks is unfitting not only because it is inconsistent with the vast majority of their developments, but also because history shows that crucial banking services have tended to be effectively supplied by private means—whenever the legal and regulatory context permitted them—without any necessity for central banks to emerge (see also Goodspeed, 2016 and Paniagua, 2019b).

3.2 Institutional Diversity Conditioned by the Legal Framework

The different institutional arrangements explored in the previous section evince different plausible evolutionary paths that the banking system might take to carry out the micro functions identified by Goodhart (1988). These varying institutional forms can theoretically be rendered comprehensible with

[67] The 'constitutional context' refers here to the specific framework of rules, or 'the rules of the game', and the mechanisms for their enforcement (Brennan and Buchanan, 2000 [1985]).

what Buchanan (2008) called 'different rules, different games'. Based on these diverse institutional formations and banking diversity, I reckon that some sort of concentration of reserves within the banking network is a natural tendency of the competitive banking business and it is present regardless of the banking regime (Selgin, 1993; White, 1984). However, this inherent nature of banking *does not mean* that the tendency will inevitably be toward a single and monocentric entity that naturally transitions into a noncompetitive central bank. To do so, the legal and constitutional framework under which banks are making their choices would need to be clearly defined and specified since these determine banks' incentives, possible economies of scale, and institutional possibilities for voluntary cooperation.

In other words, the institutional equilibrium of the concentration of reserves, netting economies, and the formation of clearing and branching nodes across the banking structure does not necessarily lead to a single overarching entity, as Goodhart (1987, 1988) assumes. Following Buchanan (1964, 2008), different banking rules and restrictions can determine the different institutional 'games structures' for how banks deal with reserves and cooperate institutionally in order to provide the micro functions. There is nothing inherent in these real reserve and netting banking tendencies furthering themselves to a single point structure and even less so into a single competitive bank (Schuler, 1992).

As Buchanan (1964) suggests, the degrees of competition in the market order '*come to be* established as institutions emerge to place limits on individual behavior patterns' (Buchanan, 1964, 29, emphasis in the original). As in the market order, the banking system will also form an institutional structure according to limits imposed by the constitutional context. It will also obtain a degree of competition through establishing auxiliary cooperative arrangements to seek gains from cooperation and economies of scale whenever allowed. The establishment of such cooperative structures however depends on the legal and regulatory framework under which they make their institutional and collective choices.

To reap economies of scale and netting or clearing economies, banks might find it beneficial to simply spread their reserves among their own private branches and headquarters and rely on ad hoc bilateral agreements (Schuler, 1992; Selgin, 1988). Instead, when transaction costs and economies of scale are external to the firm but internal to the industry, the tendency will be to form more complex institutional structures so banks can collaborate and internalize them through clubs (Dowd, 1994). However, the institutional decision of *how* banks will direct those centripetal forces to internalize economies of scale and netting (clearing) economies will widely vary according to the context and constitutional framework determining the number of banks, incentives and costs to collaborate, and availability of (internal to the firm) economies of scale (Boettke et al., 2007; Calomiris and Haber, 2014). Possible firm and industry economies of scale and collective strategies depend on the legal and regulatory framework they face while attempting to form more complex banking structures.

Additionally, the real institutional heterogeneity and diversity seen in banking arrangements resonates with Ostrom's (2000, 2010) conception of different patterns of possible organizational and governance structures *given* the institutional context that binds decision-makers' incentives and determines their collaboration possibilities. Only by understanding organizations' decision-making processes in light of a given institutional and legal context can the rationale behind collective outcomes and rules become clear (Ostrom, 2010). Thus Elinor Ostrom's (1990, 2005) notions of the contextual patterns of governance structures and institutional diversity conditioned to context are equally relevant to understand the different institutional and historical evolutions of banking systems.

Hence only through understanding the constitutional and legal context in which banks act, and how this affects and limits their incentives and information to collaborate, is it possible to explain the formation of alternative and diverse (either monocentric or polycentric) banking structures. More importantly, this Ostromian-oriented notion of banking's diverse and heterogeneous institutional equilibria and their different governing structures *conditioned* by the legal and geographical context severely undermines Goodhart's (1987, 1988) general account of the natural evolution of only central banks. Consequently,

the constitutional and legal context then *constrains* the possible individual and collective choices in the institutional discovery process of banking in order for banks to seek economies of scale through different cooperative arrangements.

These insights illuminate theoretically the wider possibilities for the institutional banking evolution of the centralization of reserves and clearing services (Paniagua, 2019b). They show that the institutional formation of the banking system depends on the patterns of collective outcomes and collaboration in the organization of banking, which are shaped by the regulatory framework that structures and limits collaboration and incentives (Buchanan, 2008; Calomiris and Haber, 2014). These insights imply that Goodhart's narrow rationale for central banking could be potentially instead a broader *polycentric rationale* that sustains wider and dissimilar forms of cooperative banking structures dependent on the constitutional context that constrains self-governing collective action and collaboration (Brennan and Buchanan, 2000 [1985]; Ostrom, 2000; Salter and Tarko, 2018).

This richer constitutional and political economic perspective on banking institutions severely weakens Goodhart's narrow evolutionary arguments for the emergence of *only* central banks. This perspective suggests that an a priori *unknown polycentric order* of clearinghouses, bankers' banks, or bank-branch networks could emerge, conditioned by the rules of the game in which banks could potentially collaborate (Buchanan, 2008; Paniagua, 2019b). In fact, this analysis and the historical evidence reviewed strongly suggest that wider possibilities for polycentric and decentralized private banking arrangements can successfully exist in order to provide—at different levels of governance—the micro functions (Goodspeed, 2016; Paniagua, 2018b; Salter and Tarko, 2018). Goodhart's (1988) account of the emergence of a bankers' bank as the *sole* evolutionary form of banking reaches a narrow and unfitting conclusion since it neglects the constitutional and regulatory context that constrains governance, polycentricity, collaboration, and institutional formation.

3.3 Central Banking and Clearinghouses: An Institutional Comparison

As I have argued, Goodhart's (1987, 1988) claims for the generalized natural formation of bankers' banks and their natural transition to central banks are unwarranted both historically and theoretically; hence they need to be constitutionally contextualized in order to be coherent. Nevertheless, despite the lack of any historical or theoretical natural evolutionary justification, central banks might still be preferable to contestable clearinghouses in a comparative institutional sense to provide the crucial micro functions. Regarding the micro functions (see footnote 36), the usual institutional responses for the problems that a banking system faces are similar to institutional responses in other economic activities that suffer also informational inadequacy (asymmetries), monitoring problems, and the provision of specialized services. The common institutional response to those challenges is to establish some form of club or voluntary association (Buchanan and Tullock, 1962; Ostrom, 1990). The reason is that voluntary associations can deal better with economies of scale and the need to reduce costs to effectively deal with free-rider problems, reputation commons, and informational asymmetries (Ostrom, 2010; Paniagua, 2019b; Yue and Ingram, 2012).[68]

Hence, clearinghouses could emerge as private clubs in which nonmembers are excluded from the key micro-function services and bank members show direct and constant evidence of their trustworthiness. The banking club, then, in a way encapsulates information concerning the reputation of the whole club and the responsibility and soundness of its members, informing the market of their accountability and soundness (Gorton and Mullineaux, 1987). The arguments for the existence of this form of club arrangement rest on the fact that the nature of banking leads to the concentration of reserves and to economize on clearing services. In addition, banking activities also possess information asymmetries, potential systemic risks, and reputation and confidence effects that might lead to negative externalities

[68] I am referencing an exclusive (private) club that deals with an impure public good, namely public trust and confidence in the banks through self-regulation (Buchanan, 1965; Paniagua, 2019b; Yue and Ingram, 2012).

and potential free-rider problems among competing banks (Goodhart, 1988; Hardy, 2006).

At the source of potential and systemic bank runs are problems related to conflicts of interest, asymmetries of information, and reputation commons (Bordo, 1990; Diamond and Dybvig, 1983; Goodhart, 1988; Paniagua, 2019b). These reputational and externality problems suggest that the formation of clubs *or* a central bank could potentially ameliorate and internalize them (Giannini, 2011; Goodhart, 1987; Yue and Ingram, 2012); nevertheless in evaluating these potential banking problems and comparing the institutional properties of how clubs and central banks could handle them, Goodhart (1987, 1988) favors the latter.

Goodhart's major claim in this institutional comparison leading him to favor central banks rests on his belief that voluntary associations are *unable* to effectively perform the micro functions (the bundle of banking services related to financial and banking supervision, bank regulation, and the role of lender of last resort). Goodhart maintains that—similar to the Suffolk experience—a strong competitive bank member will most likely dominate private clubs and then assume a central administrative role within them, undermining the clubs' performance and impartiality. Goodhart argues that bank clubs could be fragile, ineffective, and fail because of greater conflicts of interest, lack of cohesion, bankers' pressure, and for-profit incentives that plague clubs; these commercial conflicts impose negative externalities on the banking system's regulation and stability (Goodhart, 1988, 37–39, 71–73). These deficiencies and tensions make clubs unlikely to reliably manage the micro functions in a way that is consistent with the public interest (Goodhart, 1988, 45). Goodhart's preferred solution is consequently for a bankers' bank that dominates clearing and netting arrangements to *transition to* a full nonprofit governmental status.

Nevertheless, just because self-governance possesses challenges and might be imperfect, this is *not* a sufficient condition to justify the claim that a government solution is a priori and always superior and easily attainable (Demsetz, 1969; Ostrom, 1990). To avoid falling for what Demsetz (1969) denominated the 'nirvana fallacy', a more thorough comparative institutional analysis is warranted (Demsetz, 1969; Pennington, 2011; see also chapter 6). I briefly undertake this analysis in order to see whether competition among contestable clubs is 'fragile' enough (institutionally speaking) to justify the imposition of an outside bureaucratic agency (Goodhart, 1988, 4; on this matter see also Salter and Tarko, 2018). Although—and as seen in the previous sections—the banking system's natural evolution has *not* necessarily led to central banks; they might still be preferable to clearinghouses on comparative grounds. Thus a comparative institutional analysis is necessary. In order to do so, I evaluate their institutional comparative advantages and weaknesses based on how they might actually operate given real political conditions and incentives (see also Paniagua, 2019b).

To effectively overcome conflicts of interest among members, clubs could appoint an independent body or board of directors. An external firm that provides clearing services, a club council, or a club commission—one that would have *no* involvement in regular banking businesses—could eliminate the conflicts of interest natural in banking operations (Cannon, 1910; Gilpin and Wallace, 1904; Gorton and Mullineaux, 1987). However, how can such a council be insulated from the pressure of banking members? How can clubs be conducted by entities insulated from banking pressures while also being able to maintain their independence and accountability? Given these potential conflicts, lack of cohesion, and bank pressures, Goodhart advocates 'the establishment of a public body, which is, however, separated from, and independent of, the immediate political arena' (Goodhart, 1988, 72).

Nevertheless, Goodhart's confidence in the possibility of establishing such an institution by political design seems unjustified. While it is true that there are potential conflicts of interest and pressure-group problems that critically affect private clearinghouses, these issues apply symmetrically also to any form of government-established central bank; in fact, they may apply to an even-greater degree. The problem is symmetric: how is it that banking supervision and monitoring can be done effectively by public governmental entities insulated from political and private banking pressures?

It has been recognized in the literature that the concentration of power and the increased concentration of supervision of economic activities by a single entity largely increase the potential private benefits from regulatory capture (Hardy, 2006; Laffont and Tirole, 1991; Stigler, 1971). Bank regulation in its most concentrated forms has been shown to be specifically susceptible to capture by interest groups (Calomiris and Haber, 2014; Hardy, 2006). These regulatory-capture problems present in a single central entity are potentially much more severe than in a system that relies on a decentralized regulatory structure of competing clubs.

As Laffont and Tirole (1991) pointed out, regulatory capture is likely to be increasingly beneficial to interest groups in economic activities in which the groups are highly concentrated and there is much at stake. This is especially the case in banking systems lacking high levels of existent or potential competition, with impediments to branching, and with a single overall political regulator that concentrates power (Hardy, 2006; Kroszner and Straham, 2001). Commercial banks in a central bank–regulated environment will possess higher collective market shares; this leads to the organization of large banking associations and hence to greater incentives for and potential concentrated gains from regulatory capture (Barth, Caprio, and Levine, 2006; Hardy, 2006). The potential gains from capture are therefore *larger* and the organizational costs much lower in a system in which banks need to capture only a single recognizable supervisory agency. The opposite occurs in systems that have fragmented and competitively shifting (contestable) responsibility for supervision and regulation distributed among clearinghouses, diluting the potential benefits from capture (Cannon, 1910; Gilpin and Wallace, 1904).[69]

Furthermore, unlike the case of competitive and decentralized clubs, it is not only from private banks that a central bank potentially needs to insulate itself, but also from the whole structure of politics, government, interest group pressures, and congressional oversight (Barth et al., 2006; Becker, 1983; Boettke and Smith, 2013, 2015; Kroszner and Strahan, 2001; Posner, 1974). Indeed, public choice scholars and political scientists have found these private and political pressures on central banks' capacity to be independent policy makers and effective regulators to be far from negligible (Adolph, 2013; Alesina, 1987; Grier, 1991; O'Driscoll, 2011).[70] This suggests that economic pressure from banks, pressure from potential regulatory capture, and political pressure are potentially much greater and more generalized for central banks. Moreover, if somehow central banks could be insulated from political pressure through providing them political independence, the problem is not resolved but is simply shifted toward how they could be kept accountable and to whom (Cukierman, 1994; Meltzer, 2009).

Under the establishment of a public body, politically appointed regulators are both protected and disassociated from the potential pecuniary and nonpecuniary costs of a loss of reputation and negligence of the banking club members (Yue, Luo, and Ingram, 2009). This severely lowers their incentives to constantly monitor and guide banks toward socially optimal compliance, exacerbating the possibilities for irresponsible banking behavior (Adolph, 2013; Barth et al., 2006). Regulators, being part of a bureaucracy rather than a competitive collective governance structure, are not part of the reputation commons that usually holds clearinghouses and banks accountable, thus having fewer incentives and less 'skin in the game' to monitor and regulate effectively (Paniagua, 2019b; Yue and Ingram, 2009).

Hence a politically appointed bureaucracy has a different organizational structure that largely allows it to be detached from the reputation commons of banks and their financial behavior. This alters the regulators' incentives structure, their cost-benefit analysis, and their optimal decision-making in regard to regulation. More importantly, this potentially allows for the possibility that regulators might pursue their

[69] Concerns about potential problems with regulatory capture of central banks by big banks seem to be more than justified given the recent episodes of the Baim Report, the Carmen Segarra recordings, and the case in which the New York Fed was involved with major Wall Street banks in the acquisition of credit default swaps from American International Group (Bernstein, 2014; Fox, 2014).

[70] For a review of presidential and congressional pressures on the Fed, see Meltzer (2009). For a historical review and cases of presidential political pressure on the Fed, see Boettke and Smith (2013, 2015).

narrow and non-bank-oriented self-interest rather than 'socially optimal' levels of supervision and regulation (Adolph, 2013; Boot and Thakor, 1993). This political structure further intensifies wider potential pressure and capture from politicians, congress and parliaments, internal bureaucratic disputes, and interest groups' pressures to use and leverage bank regulation for power and economic redistribution and other populist ends (Becker, 1983; Barth et al., 2006; Calomiris and Haber, 2014).

Overall, the bureaucratic arrangement for banking regulation generates a misalignment of incentives under the public structure in which regulators first externalize the potential costs of banks' negligent risk management and loss of reputation, then internalize the benefits of potential regulatory capture. These misaligned incentives and asymmetrical benefits bring potential negative repercussions in the long run for the stability of the entire banking system. Indeed, the economic theory of regulation provides reasons to be highly skeptical about how central banks can optimally deal with the micro regulatory functions (Boot and Thakor, 1993; Posner, 1974; Stigler, 1971). In contrast, the potential overall benefits from competitive private regulation might be larger since such institutions are driven mainly by profit, survival, competition, and banking efficiency, rather than by rent seeking and political bureaucratic objectives (Calomiris and Kahn, 1996; Stringham, 2016).

Clearinghouses' emergent regulations and standards are largely motivated by the convergence of the self-interest of the members involved (Dowd, 1994; Yue, Luo, and Ingram, 2009). The costs of a loss of reputation and quality of the clearinghouse or the banks are entirely internalized by the members and the clearinghouse (Paniagua, 2019b; Yue and Ingram, 2012). Additionally, if a bank member seeks to capture the entire club for its own benefit, in the long run it will only undermine the club itself, possibly leading it to collapse (Cannon, 1910; Trivoli, 1979). Hence, the cost and risk of capture is internalized to all the bank members, making such cost in the long run higher than the possible short-term benefits.

Furthermore, since commercial banks suffer from stochastic fluctuations of their reserves (Selgin, 1988), they will potentially rely also on the interbank lending coordination of the club. Thus, it is in their best interest to keep the clearinghouse afloat, defend its integrity, and constantly inform it of their solvency and activities (Gorton and Mullineaux, 1987); this interbank lending coordination further aligns banks' incentives toward compliance and transparency, and to allow others to monitor them. Competition and decentralization create the conditions in which the independent body of the clearinghouse will have the incentives to uphold appropriate and efficient rules, and apply them equally to the bank members. Consequently, its objectives are to obtain some profit by providing a long-term (sustainable) valuable service and to avoid bank members' exit or a degradation of the quality of the regulation and supervision provided. Similarly, bank members—by being part of the reputational banking commons—also have incentives to collaborate and disclose information expediently (Dowd, 1994; Yue and Ingram, 2012).

Under these competitive and voluntary arrangements, the reputation commons and the collective benefits lead private banks to *willingly adjust* their profit-maximization strategies and risks to private regulation. This voluntary adjustment is based on the banks' potential costs of noncompliance with the clearinghouse rules and hence the risk of losing their membership and liquidity-reputational benefits. Since banks find it economically (and with respect to risk and stability) beneficial to be part of the club to access an interbank-club lending market and to reduce their reputation and information problems, this further incentivizes them to adjust their profit-maximizing strategies to the club's rules and regulations. A decentralized and contestable network of banking clubs (clearinghouses) reduces moral hazard and the potential tensions between profit-maximizing behavior, the optimal amount of reserves, and negative externalities from imprudent banking (Calomiris and Kahn, 1996; Yue and Ingram, 2012).

3.3.1 Decentralized regulation and supervision

Despite the above analysis, according to Goodhart the capacity of banks to achieve a higher degree of, and stable, self-governance is questionable. He argues that the degree to which self-regulation can operate

by independent agencies critically depends on the cohesion of the bank members, the actual number of members, and the complexity and heterogeneity of their activities (Goodhart, 1988, 72, 103). Goodhart seems to attribute a large number of members and a lack of cohesion among them as the reasons why 'clubs' associations' will not be able to self-regulate properly. His theoretical mistrust of clearinghouses is based on the assumption that a private regulatory service cannot be provided consistently because of large increases in membership, irreducible conflicts of interests among members, or heterogeneity, which leads to a lack of cohesion and club instability (Goodhart, 1988, 71–73).

Contrary to Goodhart, Hardy (2006) shows that when there is only a single entity regulating the banking system, it increases the benefits for big banks to encourage stricter and unnecessary regulation (regulatory barriers of entry) rather than socially optimal rules. Hardy also shows that when regulatory jurisdictions compete, the regulatory regimes do not need to converge to a homogenous set of regulations. Nor will competition lead to a convergence toward low levels of regulation or a 'race to the bottom' regulatory equilibrium (Hardy, 2006; see also Stringham, 2016 and Yue and Ingram, 2012).[71] In fact, competitive clearinghouses may not always seek to weaken their regulatory regimes, even if they act in the interest of their bank members. Instead, a clearinghouse or 'jurisdiction's competitive strategy needs to weight the direct cost of tough regulation against the higher financing cost provoked by a reputation of lax prudential rules and supervision. Moreover, jurisdictions may become highly differentiated' (Hardy, 2006, 19).

The fundamental implication of Hardy's analysis is that the institutional and regulatory characteristics of a given clearinghouse are self-reinforcing and heterogeneous and do not need to converge (see also Yue and Ingram, 2012). Additionally, the clearinghouses' self-reinforcing characteristics and differentiations allow a polycentric institutional and regulatory order to form in which each clearinghouse distinguishes itself by providing a unique regulatory and monitoring bundle of micro functions or banking services (Paniagua, 2019b). Hence under competition and contestability they will differentiate in a process of regulatory Tiebout sorting (Rosen, 2003; Stringham, 2016; Tiebout, 1956).[72] This regulatory sorting leads to more personalized services and regulation of the bank members, allowing the formulation of alternative sets of rules that are better aligned with the members' actual and ever-changing banking activities and needs. Hence as Rosen (2001) has recognized:

> We find support for the hypothesis that competition among [bank] regulators has beneficial aspects. Regulators seem to specialize, offering banks that are changing strategy the ability to improve performance by switching regulators. There is also evidence that the ability to switch regulators allows banks to get away from an examiner that desires a quite life [i.e., is inefficient]. (Rosen, 2001, 1)

Competitive regulation benefits and profits from banks' local preferences and contextual procedural knowledge, increasing transparency, regulatory efficiency, and financial stability (Hardy, 2006; Rosen, 2003; Yue and Ingram, 2012). The emergent rules in this competitive setting reflect local banks' needs, procedures, and business methods, promoting a constant regulatory discovery process on behalf of clearinghouses (Gorton and Mullineaux, 1987). This also enables strong and constant economic and epistemic feedback mechanisms between banks and regulators. These mechanisms—under cooperative and local arrangements—are swifter and stronger (more robust) than those usually available through political and bureaucratic processes (Boettke et al., 2007; Ostrom, 1990). When banks as customers are involved in the self-reinforcing process of establishing clubs' regulations and procedures, they willingly communicate their common practices and preferences to clubs.

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[71] For empirical evidence of the positive properties of competition among bank regulators, see Hardy (2006), Barth et al. (2006), Rosen (2003, 2001), and Yue, Luo, and Ingram (2009).

[72] For more details on this process see Rosen (2003) and Rosen (2001). One of the advantages of banking Tiebout sorting is that it occurs *within* a private competitive-governance context and therefore avoids problems associated with quasi market failures (Boettke, Coyne, and Leeson, 2007).

The regulations and monitoring processes of the members can be achieved with more-specialized and local knowledge and therefore more efficiently (Ostrom, 1990). On the other hand, regulations that come from a top-down noncompetitive context can potentially respond to other sets of *extramarket* incentives and political pressures, becoming ineffective to govern local situations (Boettke, 2010). Top-down regulation can indeed respond to inferior, and contextually different, regulatory feedbacks for learning and improving policy (Becker, 1983; Boettke et al., 2007; Ostrom, 1990). Central banking regulation can then be severely disassociated from the banking context (knowhow) and banks' real business activities, and it can even respond better to interest groups and ideology (Barth et al., 2006; Kroszner and Strahan, 2001; Posner, 1974). Top-down regulation potentially *redirects* the optimal set of rules and monitoring away from what banks actually need and demand toward what interest groups and politicians need and demand (Calomiris and Haber, 2014).

A crucial aspect of the self-reinforcing regulatory element of clearinghouses is that it actually leads to a sorting and concentration of *homogenous banks* that seek similar sets of regulations and other banking services (Hardy, 2006; Yue and Ingram, 2012). This concentration and sorting allows the market for banking clearing and regulation to fragment into a decentralized polycentric structure of different sizes and into different forms of cohesion and regulation. Additionally, contrary to Goodhart's misgivings, system-wide sorting actually increases local homogenization, coordination, and cohesion among the sorted bank members by decreasing unnecessary growth of bank membership and potential conflicts of interest among them (Calomiris and Kahn, 1996; Tiebout, 1956; Yue, Luo, and Ingram, 2009).

Since banks actually benefit from lower rates, more-liquid interbank lending, and a sound reputation commons, they have the incentive to not impose (unreasonable) barriers to entry to new potential members (Paniagua, 2019b).[73] These polycentric characteristics *increase* the possibility of a stable competitive set of regulatory services across the system of clearinghouses, avoiding cohesion problems and conflicts of interest. Moreover, these stability and robust self-governing properties are actually nonexistent in a top-down centralized regulatory system that curtails competition and the decentralized discovery process of rules and best practices (Boettke, 2010; Stringham, 2016).

The conclusion of the analysis of competitive regulations is that the concentration of regulatory roles into a single bureaucratic entity cannot be justified comparatively. Competitive self-governing regulatory institutions seem to be much superior to what Goodhart assumes. These findings are further supported by historical and statistical evidence with application to clearinghouses (Cannon, 1910; Gilpin and Wallace, 1904; Yue, Luo, and Ingram, 2009).[74] All this shows that Goodhart's reservations regarding the degrees of efficiency and institutional robustness of bankers' clubs in dealing with conflicts of interest and member pressures seem far less justified. Furthermore, his confidence in a single politically isolated bureaucratic entity is far more unsubstantiated than previously acknowledged.

3.4 Conclusions

The postcrisis literature has not paid much attention to the micro regulatory functions that could justify central banks. It has drawn attention to neither the core arguments that sustain an institutional justification for central banks nor their evolution. I hope that this chapter has contributed to research in this direction. Since Goodhart's (1988) thesis rests on the fact that the micro functions are the core justification for central banks, I provided historical and institutional evidence to scrutinize the rationale sustaining his thesis (see also Paniagua, 2019b). Further historical evidence that severely challenges Goodhart's evolutionary claims of central banks will be explored in chapter 4. I have extended the arguments on banking institutions by finding a bridge between them and the theory of clubs and self-

[73] The greater stability of private arrangements has been shown by available data (Yue and Ingram, 2012).

[74] Additionally, Yue and Ingram (2012) review the episode of the New York Clearing House Association. They show that the self-governance of clubs can be quite a successful strategy for the members to deal with interbank lending, promote collective solvency, and promote prudent lending among themselves (see also Salter, 2018 and Paniagua, 2019b).

governance, which could be a fruitful path for further research (Salter, 2018; Salter and Tarko, 2018).

In regard to Goodhart's (1987, 1988) and Congdon's (1981) claims, I reviewed evidence that disputes their generalized historical claims. Furthermore, I showed that Goodhart's limited institutional rationale for central banking is not inescapably a narrow rationale exclusively for it, but rather a rationale for a wider possible set of alternative polycentric arrangements able to provide crucial banking services. Importantly, I have also suggested that the possible emergence of clearinghouse polycentricity, banking diversity, and branch-banking networks is severely conditioned to the constitutional context and the legal framework that banks ultimately face.

These arguments have deep implications for banking research going forward. First, central banks are not a natural, inherent phenomenon but rather the outcome of an evolution dependent on a skewed institutional framework that suppressed competition and granted monopoly powers (Bagehot, 1873). Thus societies *do not* carry the burden of being 'institutionally stuck' with central banks. They can and they should look for more resilient alternatives based on rearrangements of property rights and legal frameworks (Selgin, 1988, chapter 11). Second, by showing how competitive private clubs may better provide the micro functions, I have hinted that lending on distress, financial regulation, and prevention of bank runs *are not entirely* 'public goods' but rather possess deep characteristics of *privateness*. Hence their successful provision resides more within the realm of cooperative and competitive clubs than in the system of *pure* public goods (Buchanan, 1965; Yue and Ingram, 2012). This has repercussions for banking policy and financial stability since it opens the possibilities of seeking banking reforms based on private governance and polycentric banking. These unrecognized institutional and self-governing arrangements are plausible and robust solutions to banking regulation and financial stability.

On evolutionary and institutional grounds, there are no strong reasons to claim that there is a "natural tendency" of banking systems to always develop the formation of monocentric central banks *over* the formation of competitive clearinghouses, in order to deal with the micro regulatory functions. I showed that given the nature of banking and the historical evidence, the generalized argument for the natural evolution of the banking system toward a central bank is groundless. Instead, the rationale and need for the micro functions justify the emergence of different and cooperative institutional arrangements that might vary widely according to the context that banks face. Given the constitutional framework binding collective action, different forms of arrangements might emerge—from the full decentralization of banks to more hierarchical and cooperative structures. To what extent the banking system moves toward one or the other depends on the market context and the legal framework that severely conditions banks' collaboration and collective action.

In sum, there is no generalized and natural justification for central banking as Goodhart claims. Moreover, when evaluating the comparative properties of arrangements, I showed that clearinghouses seem to deal much better with the micro functions than central banks. Banking self-governance is better at dealing with incentive misalignments, regulatory capture, and political pressure. Hence on comparative grounds, I find that the institutional preference for central banks over a polycentric system of banking is erroneous (see further evidence in chapters 5 and 6). I conclude that both history and theory show that the natural justification for central banks is unfounded. Hence Goodhart's and Congdon's attempts to provide a general justification for central banks is ultimately mistaken, and their comparative institutional defense is much weaker than previously acknowledged.

However, there is the need to acknowledge also that, as an historical and financial matter, central banks have been important players in the deepening and development of financial markets; particularly those of sovereign debt and long-term bonds, as well as innovations in public finance (Giannini, 2011; North and Weingast, 1989). One could argue that we fail to appreciate the broader social role of central banks as institutions if we judge them narrowly, based only on contemporary standards of macroeconomic stability and bank runs. Nevertheless, due to length and focus, this issue will not be developed further in

this work. Hence, it's worth clarifying that the main focus of this thesis concerns only the narrow economic and macroeconomic justifications of central banks; and consequently, this work seeks to assess the relevance and contribution of central banks strictly on contemporary standards of macroeconomic stability, monetary policy and banking regulation. In other words, the more recent mandates of macroeconomic stability and prudent monetary policy are the relevant issues for the purposes of this analysis. This means that the conclusion concerning the *lack* of strong reasons to favor the foundation of central banks is limited to this margin. Further work should be encouraged to assess the justification for central banks on other grounds such as their alleged contribution to the development of financial markets and innovations in public finance.

In the following chapter, I will explore further the historical arguments, evidence, and evolutionary claims briefly explored here in order to provide additional, and more detailed, historical evidence against Goodhart's claims concerning the natural evolution of central banks, with a particular historical focus on the Bank of England (one of the oldest and most important central banks ever established). I will do so also to indicate that central banks' apparent natural institutional evolution can more coherently be described by unique *political* processes and economic–political bargains. These unique political and entangled processes that actually generate the unusual (non-economic) establishment of central banks are, for instance, repetitive political-bank bargains and political entanglement dynamics, in which some proto–private commercial banks acquire political, nonmarket, and uncompetitive characteristics over time, in exchange for credit and banking benefits for the sovereign.

In other words, and as Bagehot (1873) suggested, the paradigmatic example of the evolution of the Bank of England—based upon unique processes of political entanglement—is particularly telling and relevant for understanding the politically based, and thus unnatural (non-economic), evolution of central banks within banking systems. Therefore, and as Bagehot and Vera Smith intuited, it is important to scrutinize the case of the Bank and its historical evolution in further depth in order to obtain relevant institutional and theoretical lessons that can enrich the debate over the inherent need for, and political evolution of, central banks.

Chapter 4

Bank Bargains and Entangled Political Economy: The Evolution of the Bank of England[75]

> 'A central bank . . . is not a product of natural development. It originates through government favors and bears special privileges and responsibilities. Typically, it serves as banker for the government and for the ordinary banks and monopolizes or dominates the issue of paper money. From this privilege derive the secondary functions and characteristics of a modern central bank. . . . The special privileges and dominant position of a central bank thrust responsibilities onto it that dilute or override its profit orientation'.
> Leland Yeager, 1990, xv–xvi

As suggested in the previous chapter, since the publication of Goodhart's locus classicus *The Evolution of Central Banks* there has been little work on central banks' nature, their fundamental roles, and, perhaps most importantly, their institutional evolution (Broz, 1998; Goodhart, 2010; Giannini, 2011; Selgin, 1993). The lack of critical evaluation of central banks' evolution and their institutional rationale has been more acute in the postcrisis literature. Goodhart's general overview of early central banks' evolution and establishment is well demonstrated by his account of the Bank of England (Goodhart, 1988, 15–19, 45–46, 104; Selgin, 1993). Similarly, Vera Smith (1990 [1936])—a pioneer in bringing back the old Bagehotian controversy concerning the rationale and evolution of central banks—sought to explore the fundamental origins and evolution of central banks with a particular focus on the Bank of England.

Goodhart's and Smith's focus on the Bank of England echoes also Bagehot's (1873) original concerns about the establishment of central banks. Like Goodhart and Smith, Bagehot considered the Bank's case as a paradigmatic and illustrious example of how central banks truly arose and developed from processes of political entanglement initiated by governments' political interventions in the banking system. Additionally, Vera Smith's (1990 [1936]) historical and institutional explorations sought to shed light on the fundamental origins of central banks and to understand how they might develop as institutions from certain special privileges originally granted by governments. These political dynamics hinted at by V. Smith and Bagehot will be the core focus of attention in this chapter, which provides further evidence that deeply challenges Goodhart's (1987, 1988) and Congdon's (1981) claims that central banks arise naturally and are therefore institutionally necessary (see also Giannini, 2011).

Building on Goodhart's main arguments and the theoretical and historical insights explored in the previous chapter about central banks, chapter 4 dives into the paradigmatic historical case of the Bank of England. It further explores and develops the underlying theory of Goodhart (1988) concerning the evolution of monetary institutions and the dynamics that can help explain the political evolution and emergence of central banks. More specifically, this chapter examines the establishment and evolution of the Bank of England, approximately between the years 1694 and 1890 (see table 1 in section 4.2.1 for a summary of the Bank of England charters). It utilizes a framework of entangled political economy, which originates in a process of politically led bank bargains between private banking interest groups and governments (Wagner, 2017). The historical case of the evolution of the Bank of England is a

[75] A modified version of this chapter is forthcoming in the *Journal of Public Finance and Public Choice* (Paniagua, 2019a).

paradigmatic example of the establishment of a central bank, and it helps to shed additional light on the political and economic mechanisms of, and the institutional rationale behind, the development of central banks.[76] Thus it further enriches and complements the insights about monetary institutions and their inherent need (or lack thereof) as detailed in chapter 3.

A central bank may originate, V. Smith (1990 [1936]) argued, either as a privately owned and profit-seeking banking institution or as a politically established institution aimed at helping to finance government expenditures and war efforts since its foundation (see also Glasner, 1989). These two plausible origins are not incompatible, and they might be complementary aspects of central banks' origins and the original motivations for their establishment (Yeager, 1990). The key point, Bagehot (1873) and Smith (1990 [1936]) argued, is that a central bank, and its institutional capacity to grow in bureaucratic complexity, must find its origins and *evolutionary catalyst* within the special economic-political privileges and dominant position originally granted to it by government.

If this entangled and evolutionary conjecture is proven correct, then most of the arguments reviewed in the previous chapter concerning the natural evolution of, and inherent institutional need for, central banks are severely weakened. Hence, given the relevance of this Bagehotian conjecture for the debate over the institutional rationale and need for central banking, this chapter will address it in depth. The above conjecture is critical for part II of this thesis and for the whole debate concerning the institutional rationale for central banks since it suggests that the true origins of and catalyst for the establishment and institutional evolution of central banks reside mostly within bank bargains and special privileges originally granted to them by governments and sovereigns.

Thus central banks' origins and the original impulses for their institutional evolution toward a nonprofit and public structure reside in the special dynamics of political entanglements and bargains between private banks and political institutions (the sovereign). Thus this chapter argues that bank bargains and entangled political-economic dynamics might actually be the core features that provide the key dynamic mechanisms for what had been previously believed to be the natural institutional evolution of central banks.[77] It argues that the bargains set in motion the processes of political entanglement that subsequently led to the transformation of selected for-profit banks into nonprofit and private–public hybrid kinds of bankers' bank and eventually central banks. The evolution of the Bank of England is a paradigmatic example of this entangled dynamic.

Consequently, it is the above Bagehotian conjecture concerning the unnatural (entangled) and primarily politically oriented institutional evolution of central banks that will be the core focus of attention of this chapter. Ultimately, if this chapter is able to show that central banks indeed evolve mostly out of entanglement dynamics and political processes initiated by bank bargains and by special privileges granted solely by the sovereign, then not only will Bagehot's (1873) conjectures be proven accurate, but Goodhart's (1988) and Congdon's (1981) natural evolutionary claims will be questioned. Accordingly, this chapter complements the arguments explored in chapter 3 against Goodhart's institutional claims.

Smith (1990 [1936], chapter 2) argued that the political–private bargains for privileges noted above and the government's needs to finance war efforts were the ultimate reasons for the establishment of the Bank of England. The Bank, as has been pointed out by V. Smith, Bagehot, and Goodhart, is a crucial

[76] The 1694 inception of the Bank has been a matter of extensive study in the banking literature. Classic works on the Bank and its early years include Andréadès (1924), Clapham (1944), Philippovich (1911), and North and Weingast (1989).

[77] This chapter borrows the concept of 'bank bargains' from Calomiris and Haber (2014). They referred to 'the game of bank bargains' as the whole political and economic process through which political coalitions in power receive, manage, and distribute the concentrated economic benefits and spoils offered by private banks in exchange for both political favors and monopolistic powers to those private banks. This includes also the subsequent political processes of dispersing the cost of granting banking privileges, banking rescues, and regulation onto the rest of society (e.g., uninformed voters). In other words, bank bargains can be considered as a *subset* of the classical and more general form of public choice political and economic exchange (see Buchanan, 1964; Olson, 1965; Tullock, 1965).

and paradigmatic example of the institutional evolution of a central bank (see also Clapham, 1944), given the Bank's relevance in the institutional debates, in the world banking and financial system, and its longevity (the second-oldest central bank in the world after the Swedish National Bank).

However, despite the works of Bagehot (1873) and Smith (1990 [1936]) concerning the fundamental fiscal origins of and war-related institutional needs for central banks, and even though economists now have a fair understanding of the political and fiscal reasons why central banks might be established (Broz and Grossman, 2004), not much research has been done about how central banks evolve institutionally and as bureaucracies, how they grow in bureaucratic complexity, and how they acquire secondary (but extremely relevant) functions within the economy through time (Goodhart, 2010). These gaps in the banking literature will be a crucial focus of attention throughout chapter 4, and they will be tackled mainly through a framework of entangled political economy (Wagner, 2010, 2017).[78]

Additionally, building upon the previous chapters, chapter 4 will use a broad emergentist and political-economic framework of *bank bargains* and *entangled political economy* pioneered by Calomiris and Haber (2014) and Wagner (2010, 2012, 2017), respectively (see footnotes 55 and 56 for definitions). This alternative political economic framework will enable us to understand the Bank's changing role and how it evolved from a for-profit private structure to a nonprofit political structure. Ultimately, it is argued that the Bank of England institutionally emerged as a non-profit and politically oriented bank through an unintended process of political entanglement and repetitive bank bargains.

The contribution of this chapter resides in exploring the overlooked fact that repetitive bank bargains, enacted during the seventeenth and eighteenth centuries, actually created and sustained the unintended dynamics of political-economic entanglement within the English banking system that led to the unnatural evolution of the modern Bank of England. This alternative account will set this chapter apart from Goodhart's (1988) and Congdon's (1981) claims by showing that the evolution of the Bank was a dynamic unintended process *conditioned* through political entanglement rather than stemming from the natural and competitive evolutionary forces of the English banking system.

The chapter proceeds as follows: Section 4.1 reviews the major concepts and definitions used throughout this chapter. It examines the theory of political and bank bargains and political-economic entanglement, noting how they differ from the additive concept of mainstream political economy. Section 4.2 explores the history of the Bank of England's establishment and early evolution and how the continuous charter renewals (particularly two early important ones) exacerbated entanglement. Section 4.3 reviews the Bank's evolution based on the process of concentration of reserves of the entire banking system, enhanced by political signals, legal precedents, and the accumulation of privileges. Section 4.4 concludes.

4.1 Additive Political Economy, Bank Bargains, and Entangled Political Economy

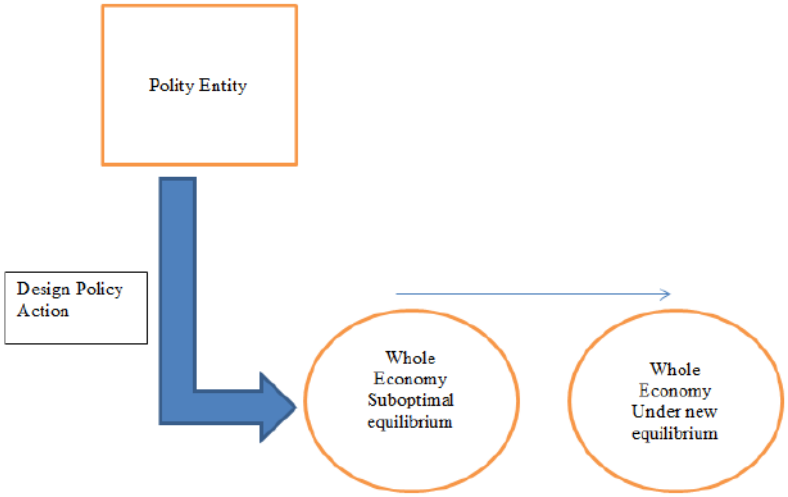
[78] Entangled political economy is an alternative framework for analyzing the interactions between political and economic entities in a decentralized fashion. It differs from the standard 'aggregative' political-economic approach used in economic textbooks mainly in that the polity and the economy are not conceptualized through macro and aggregative reductions as having point-mass status (see figure 1). The difference between entangled political economy and the standard approach resides in the conceptual treatment of systems of political economy. While the standard approach uses the macro-level material associated with exogenous economic disturbances and treats the elements of the polity and the economy as aggregative and separated conceptualized pure forms, the entanglement approach treats polity and economy as decentralized networks of interacting nodes (Wagner, 2010). For entanglement to be possible among different entities, they must be conceptualized as networks in which individual nodes (political or economic) create particular connections with other nodes (see figure 2). Furthermore, those connections run through both arenas of action (the political and the economic), and hence they cannot be treated as isolated entities as the standard approach does. In socio-economic reality, market and political actions are undertaken simultaneously inside an entangled political-economic framework. Under this alternative framework, the 'polity and economy are both arenas of activity that contain numerous interacting enterprises that are connected in a network fashion whose systemic properties depend on the structure of the network' (Smith, Wagner, and Yandle, 2011, 47). The main feature of entangled political economy, as depicted in figure 2, is that neither the polity nor the market organizations are conceptualized as reducible to a point-mass status (see also Salter, 2014a).

Additive political economy refers to 'a scheme of thought where economic equilibrium is conceptualized prior to political activity, with political activity then modifying that equilibrium' (Wagner, 2012, 9). The concept starts with the assumption that the economy as a whole is in a state of equilibrium that might not be desirable. From there the political organization as a single entity comes as an exogenous unit into the system to take a specific action to move the equilibrium to a new, and preferable, state (see figure 1).

The political entity therefore acts as a whole (united) mass to direct the economic system toward a new, preferred (Pareto-improving) state of equilibrium. This entire concept possesses shortcomings. First, it assumes that both the economy and the polity are single, divisible entities or solid unities (separated entire wholes) of equilibrated relationships (Wagner, 2010). In reality, the economic and political worlds are formed by a myriad of interacting actors and decentralized entities (see chapter 1). In that heterogeneous setting, objectives and incentives of actors might differ, but they interact in a meaningful manner. Second, the assumption that the political entity is detached both socially and economically from the economic sphere is unfounded since the polity's foundation and survival require support from the economic order (Buchanan, 1990; Tullock, 1965; Wagner, 2017).

It is important to notice that any analytical framework unavoidably will illuminate some aspects of the phenomena in question while ignoring or discarding other aspects (see chapter 1). Entangled political economy differs from the standard and 'normal approach' (Wagner, 2010) of political economy in understanding social relationships. For example, the framework of 'additive political economy', or 'separated political economy', as illustrated in Besley (2006) and Persson and Tabellini (2000), models the relationships between political and economic organizations as *unidirectional* relationships running from the political entity as a whole to economic organizations (see figure 1 below).

Figure 1: Additive Political Economy[79]



This linear and sequential relationship seemingly arises from entirely distinct, divisible institutional frameworks, modeled as point-mass systems (Smith et al., 2011). This unidirectional and linear relationship severely limits the analysis of socio-economic interactions to treating relationships as static equilibrated ones in a 'one action, one outcome' setting. For example, the government sees a space for

[79] In this figure, the polity is represented as a single whole and denoted by the square, and the single whole economy is represented by the circle. The polity acts as a single-massed entity upon the entire economy, which responds to the top-down policy as a single-massed entity, shifting its original equilibrium toward a new and Pareto-improving equilibrium. The four figures used throughout this chapter were created by the author but are based on versions of Wagner's (2010) and Salter's (2014a) figures.

improvement and the political entity acts upon the economic system to move it toward the desired equilibrium. Figure 1 above illustrates this additive and standard analytical framework.

Within the standard framework, the final societal equilibrium is generated by a process of sequential addition of two entirely separated institutional frameworks: a framework of private property, competition, and freedom of contract governing the market order, and a political-constitutional framework that governs political exchanges. Actions designed and undertaken in the political arena modify the equilibrium outcome attainable in the market arena. A crucial feature of this standard approach is that both the polity and the economy are treated as point-mass wholes that act upon one another in a linear *unidirectional* manner, as billiard balls interact within a billiards game (Wagner, 2010).

This standard view treats cause and effect as an exercise of comparative static analysis (Wagner, 2010). Implicitly this approach models the outcomes of the macro-linear relationships as if they are on the same complexity and ontological level as that at which actors make their original choices (see also chapter 1). Since the causal relationships are linear and unidirectional, and the agents have assumed pre-reconciled objectives, the macro outcomes are therefore simply derived from the agents' original choices (Kirman, 1992). Hence the societal outcomes are conceptualized at the same level of complexity and ontology as the choices made by the isolated agents (Salter, 2014a; Wagner, 2017).

This 'additive' and linear approach severely disregards the open-ended nature of choice along with the crucial yet unintended institutional consequences arising from the orderly relationships (Wagner, 2010, 2012). As seen in chapter 1, relationships, interactions, institutional evolution, and their political-economic emergent outcomes are social interactive elements of a higher complexity level, irreducible to agents' original choices in an equilibrium framework (Ostrom, 2000). These relational, emergentist, and institutional complex properties are precisely the elements that entangled political economy—and also this entire work—seeks to illuminate (Wagner, 2017).

4.1.1 Central banks' 'joint production' rationale and bank bargains

As suggested in the introduction, the more concrete goal of this chapter is to understand the evolution of the Bank of England through the ideas of bank bargains and entangled political economy.[80] Public choice and standard neoclassical economic analysis have thus far modeled central banks mainly as natural and rational institutional responses to crises and the demand for public goods, following the logic of collective action and the provision of public goods (Olson, 1965; Giannini, 2011; Goodhart, 1988). Their establishment and evolution have been interpreted as a logical (rational) and beneficial convergence between public and private interests and thus as the rational establishment of a 'joint production' kind of exchange (Broz, 1998; North and Weingast, 1989).

Thus central banks have been interpreted as an institutional manifestation of a joint-production agreement between the sovereign and the private sector, bilaterally undertaken to collectively produce public goods such as financial stability, banking supervision, banking services, and easier and more predictable long-term forms of government financing (Broz, 1998; North and Weingast, 1989). This sort of monocentric institutional arrangement, the literature argues, has been rationally created ex ante to efficiently provide *dispersed* collective benefits to society; and it additionally establishes a bureaucratic entity providing *concentrated* benefits to private interest groups (Broz, 1998; North and Weingast, 1989). Hence central banks seem to be a rational compromise and outcome of beneficial exchanges between well-intended politicians and interest groups (Broz, 1998; North and Weingast, 1989).

[80] For tractability of the specific bargain dynamics, this chapter focuses on analyzing entanglement of entities such as banks and Parliament, rather than single and specific decentralized actors involved in them. Nevertheless, propositions can still be made at the level of interacting entities despite the fact that in reality acting local individuals form them (Calomiris and Haber, 2014; Patrick and Wagner, 2015; Wagner, 2010).

While Broz's (1998) public choice concept of joint production is able to explain the microfoundations and rationale of the original (1694) Bank charter, it implicitly assumes that the first bank charter was actually a *permanent* institutional entity and thus that the Bank was originally created as a fully developed central bank benefiting all parties and society (North and Weingast, 1989). In other words, it implicitly assumes that the banking entity was fully established with its banking goals and macroeconomic objectives already defined. Therefore, it critically neglects, and is unable to explain, the role of the subsequent recharter bargains, in which the Bank gained extra, unpredicted, and, importantly, nonmarket characteristics and *evolved* unexpectedly and slowly toward a nonprofit structure and finally into a fully fledged central bank (see table 1 for a summary of the Bank charters).

In fact, history shows that the Bank's institutional properties *unintendedly* changed through time as the entanglement processes advanced because of the charter renewals and legal precedents, to the point that the Bank became a bankers' bank and the center of reserves of the entire English system (Dowd, 1993). Hence given the shortcomings of Broz's joint-production account to explain institutional evolution, this chapter proposes a different theory that extends his and Broz and Grossman's (2004) account. This proposed theory explains the unintended process by which the political-economy order becomes increasingly entangled, affecting the entire English banking system and the Bank's role in it.

The entanglement allows a polity organization (the sovereign) to transmit some of its extra-market and political features to the economy organization (banks) with which it establishes relationships. The transmission of such nonmarket features was an essential part of bank bargains between the Bank and the government (Calomiris and Haber, 2014). Building upon Stigler (1971), the 'game of bank bargains' (Calomiris and Haber, 2014) is a process that considers government policies and banking legislations as the outcomes of dynamic partnerships and exchanges among private interest groups and political coalitions that control regulation, definitions of property rights, and banking policy (see footnote 55). The constitutional, legal, and political framework shapes those partnerships and determines the current distribution of political and economic powers that might influence negotiations among interested parties.

The bank-bargain players are usually groups, entities, or institutions that have a stake in the banking system's performance and credit allocation. In this particular case, the main players were Parliament, government, and the shareholders (owners) and managers of the Bank (Calomiris and Haber, 2014, chapter 2). Coalitions, compromises, and agreements might form among the possible interested players and affect the banking industry's rules and competitive properties. Calomiris and Haber (2014, 32–34) recognize that governments possess the power to regulate banks and the power to enforce credit contracts through altering the structure of property rights via bank charters.

Particularly, through legally granted charters and legislation, governments might seek to influence the banking system's degrees of competitiveness, altering its market contestability and economic properties, so that banking responds institutionally instead to political needs and pressure groups' objectives rather than to competition, market signals, and economic efficiencies. When polity (and government) entities leverage charters, banking regulations, and the property-rights system through political deal making, they can generate a propitious environment in the chartering negotiations that could bind and entangle the polity and the banking sector. The possibility of altering the property-rights system and the legal framework established by the government for enforcing contracts through charters affects the relationships between polity entities and banks through time (Broz and Grossman, 2004).

When bank bargains—under incomplete and imperfect contracts—determine property rights and the legal and economic limits within which banks operate, banks and government actors that gain from those bargains are interested in perpetuating or enhancing (perfecting) those bargains to renegotiate and improve contracts in their favor by altering legal and property-rights structures in subsequent charters. This could generate a flexibly adjusted and symbiotic long-term bargaining relationship, opening the possibility of dynamic entanglement among the involved entities. Hence bank bargains through time (in

the form of charter renewals) could be a strong starting point of an entanglement process that perpetuates through time. Commercial banks affected by these assignments of property rights or legal constraints will no longer be private in the full meaning of the term. Banks shaped under politicized chartering arrangements and negotiations are founded on systems of partnerships with government, importing nonmarket characteristics through time that reflect different bargaining powers among the entities that negotiate the bank charter renewals (Calomiris and Haber, 2014, 13).

The fundamental point of the concept of bank bargains is that a polity or political actors that have certain enforcement and legal powers might seek to form long-term partnerships (repetitive exchanges) and negotiations with private actors. Through a mutually beneficial partnership—under incomplete contracts—the political entity wants to gain from repetitive political trades while in exchange it gives a certain bundle of property-rights (privileges) and beneficial regulatory structure to banks. The negotiated and politically oriented bank-charter structure severely affects the banking sector's economic and market for-profit boundaries, which in turn blurs (erodes) its original market boundaries via the structure of charter rights and legal privileges. Repetitive games of bank bargains therefore could start the process of political entanglement and more critically advance the entanglement's own endogenous expansion and growth.

Bank charters can be seen as institutional and legal formalizations of ongoing exchanges and incomplete negotiations (incomplete contracts) between polity and economic entities. More importantly, they also generate institutional and political-economic novelty in the social order, affecting the network of relationships and their market boundaries (Wagner, 2010). Importantly, the dynamics and rationale of bank bargains can explain how the process of political entanglement actually originates and extends across the banking system. Political entanglement can be carried forward and exacerbated with bank bargains based on flexible and incomplete contracts under uncertainty that allow for future renegotiations among parties to persist (Broz and Grossman, 2004). Critically for this chapter, the analytical nexus between, on the one hand, bank bargains under uncertainty and incomplete contracts and, on the other hand, the advancement of political entanglement has not been previously explored in the banking literature (see for example Salter, 2014a). Hence the major contribution of this chapter.

Furthermore, this nexus can also contribute to enlarging a political-economic and complexity-based understanding of central banks' developments in general, and explain the Bank of England's evolution in particular. Bank bargains can be at the core of the process that initiates political economic entanglements and continuously adds novelty to social relationships since 'entangled political economy is centered on networks and evolutionary process of development, where that development is kept in motion by individual efforts to seek gain by putting together deals that often are triadic' (Patrick and Wagner, 2015, 105). Consequently, chartering and chartering-renewal procedures under incomplete contracts that define (or rearrange) property rights and grant special privileges to banks appear to be a propitious setting for entanglement and unintended institutional evolution within the banking sector.

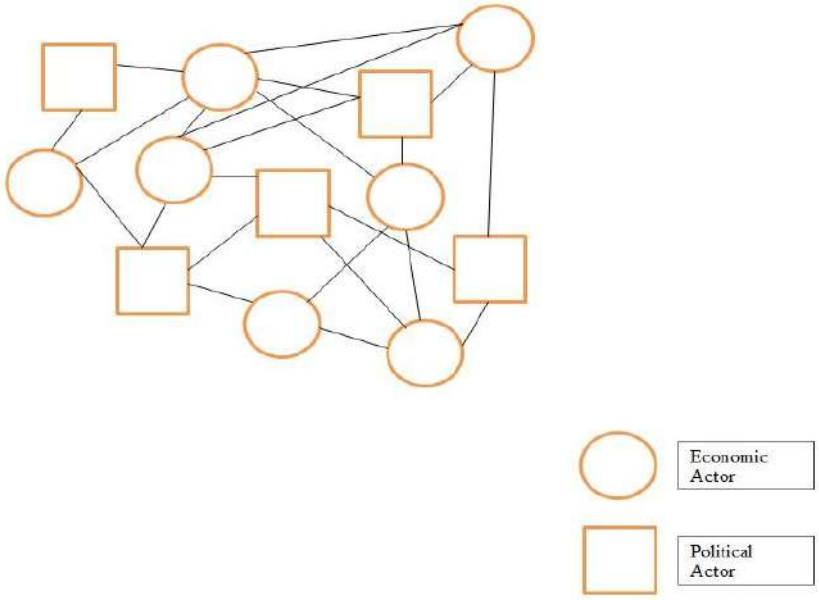
4.1.2 Bank bargains and the framework of entangled political economy

A key aspect of bank bargains resides in the ongoing negotiations in which the involved parties make deals that provide concentrated benefits to them but often externalize pecuniary and nonpecuniary costs and risks to less informed and less organized third parties (Calomiris and Haber, 2014, 37–38; Olson, 1965). This happens to also be at the core of triadic relationships typical of entangled systems (Podemska-Mikluch and Wagner, 2013; Wagner, 2017). In the case of the Bank, the process is a dynamic and bidirectional economic and political exchange between the entities involved in bargaining under unfolding uncertainties and incomplete contracts. The concept of entanglement can help to illuminate the long-term unintended institutional effects of these relationships (see figure 2). In this framework, the economy and the polity are considered as nonhierarchical nodes that establish bidirectional relationships in a complex unfolding network. The polity is no longer a single entity but a constellation of nodes with

different political and economic powers within a type of loose hierarchy of bureaucracies (Tullock, 1965; Wagner, 2010). Figure 2 below illustrates this alternative—non-additive and decentralized—framework.

Entanglement dynamics originate from the actions of the parties and actors involved in the bank bargains, who are also entrenched in a network of political-economic relationships. Unlike what the joint-production framework (see Broz, 1998) argues about institutions, the emergent and more complex institutional effects that arise from the entanglement dynamics are not part of the ex ante, conscious, and rational plans of the actors involved (Wagner, 2012). As in the process of bank bargains, the entities (or parties) enter into incomplete contracts since they expect gains from bargaining. In their rational maximizing behavior, however, neither of the parties involved has future knowledge and foresight as to where the relationships—under incomplete contracts—might lead, institutionally speaking. The unintended outcome of the bank bargains leads to a process of systemic entanglement that can be perpetuated and enhanced endogenously through the banks' narrow interests or coalitions' dynamics, affecting the overall institutional framework, incentives, and market setting in which banks ultimately operate.

Figure 2: Political Economic Entanglement[81]



Importantly for the scope of this chapter, the bank bargaining process has dynamic and endogenous synergy, because of the charter renewals, that further feeds the process of entanglement throughout the banking industry. The Bank of England's charter renewals were the unexpected product of an original and incomplete contract between private and public actors that desired to adapt the original charter through time in order to deal with unfolding uncertainties related to debt and war contingencies.

Consequently, and unlike what has been stressed in the literature (Salter, 2014a; Smith, Wagner, and Yandle, 2011), the dynamics of entanglement do not solely arise from regular interactions with a single polity 'big player' entity overseeing and regulating economic entities (Patrick and Wagner, 2015). The

[81] Figure 2 represents the entangled-political-economy framework. Here the polity and the economy are not conceptualized through reduction to aggregative point-mass status. Here instead the decentralized individual entities in the economy (represented by circles) establish multiple relationships with local political entities (represented by squares). The polity and the economy are both arenas of activities that are overlapping and interact, and thus they contain numerous interacting enterprises. This framework treats governments as polycentric orders, very similar to a form of overlapping bureaucratic enterprises, and not as single and monocentric centrally planned organizations (Tullock, 1965). It assumes that the polity is not a unified and monocentric source of power and governance, but rather a loose network of overlapping bureaucratic entities (Wagner, 2017).

entangled dynamics—as the Bank of England's case shows—can also be found in processes of political bargains and banking coalitions arising naturally within the network of interactions, given an original set of political and economic powers. In other words, the repeated interactions and banking privileges, in the case of the Bank of England, were the politically contingent consequences of the adjustments among similar parties that renegotiated bargains and updated the contract, *not* the consequences of a typical regulatory-supervisory relationship between government and economic entities (Ikeda, 1997).

Through rearranging property rights and through banking regulation, the bargains between the Bank and Parliament initiated the entanglement process, which unintentionally affected the polity–banking order and the entire banking system. Moreover, the bank bargains' direct effects upon the Bank of England actually dissipated and spread beyond the individual entities' borders, affecting also the English banking order at large, as will be shown in section 4.3. When the banking entity involved in the bargain (the Bank) reaped the benefits of the exchange, it started to *import* extra-market (political) characteristics from the polity (Parliament). The privileged position and nonmarket properties granted to a bank through the bargain overshadow and erode the relevance of the previous market process's economic and competitive discipline and guiding signals (Smith et al., 2011). Thus the entanglement undermines market and credit signals originally generated within the competitive market ordering, making the banking system more dependent upon political and nonmarket signals (see section 4.3).

Hence, as will be argued in the following section, through repetitive bargains the Bank of England became 'no longer purely a private ordering, since the terms on which it operates are now a mixture of the logic of private orderings and common orderings' (Salter, 2014a, 9). Furthermore, when such entanglement is visible and clear to other commercial banks, they will also seek to be part of it in order to reap extra-market (polity) benefits, extending the entanglement throughout the rest of the banking system (Baumol, 1990; Salter, 2014a; Smith et al., 2011). Indeed, because of crucial legal precedents, the signaling aspect of the entanglement was a decisive condition of the evolution of the Bank toward a central bank, further spreading the entanglement to the rest of the system, as I will argue in section 4.3.

Consequently, bank bargains in the form of renegotiating incomplete chartering contracts not only jump-started the entanglement dynamics between a commercial bank and Parliament, but further advanced into a progressive cumulative entanglement spreading among other commercial entities and banks in the network. The crucial unintended aspect is that gradual entanglement of the system led to further exporting (transmitting) polity and nonmarket characteristics to the commercial banks involved, eroding the private-competitive ordering of banks in England, and undermining the guiding market signals needed to efficiently provide and allocate money and credit. This point is important since these entangled and strategic interactions *do not* lead necessarily to the growth of the bureaucratic apparatus, as Tullock (1965) suggested, but rather lead to the *degradation* of the boundaries between private organizations and political entities (a form of crony capitalism) and hence the detrimental shifting of economic rationale toward political rationale among the organizations within the banking system (Baumol, 1990; Zingales, 2012).

4.2 The Bank of England's Political Entanglement Generated by Charter Renewals

As argued throughout chapter 3, Goodhart's (1988) account of the natural evolution of central banks resides mainly in recognizing that because of economic considerations such as economies of scale, simplification of interbank lending and clearing, and reducing the overall need to mobilize reserves constantly among banks (all of which reduce interbank transaction costs), competing banks have a natural tendency to centralize (and economize) reserves in the system (Dowd, 1993; Selgin, 1993). Goodhart (1988, 34) further suggested that this economizing tendency naturally leads banks to concentrate reserves with one important (and safe) bank; and that bank thus becomes a bankers' bank and a controller of reserves of the entire system (see section 3.1). From then onward, that for-profit bankers' bank, because of its crucial and systemic role in managing the reserves of other commercial banks, will naturally

transform itself into a nonprofit-for-profit hybrid central bank (see section 3.1 for more details).

Goodhart's generalized and 'inevitable' account of the 'centripetal forces' of the concentration of reserves leads him to assume that competitive banking is inherently hierarchical and monocentric as an optimal institutional arrangement, thus assuming away the possibilities of institutional heterogeneity and polycentricism in banking (see also Paniagua, 2019b). Banking competition and centralization of reserves (to economize on them) lead—according to Goodhart—to a gradual domination of a single for-profit bank that handles high levels of reserves of other commercial banks, and thus lends to competitors (unwillingly) in times of distress (Goodhart, 1988, 37). The bankers' bank then, by gradually accumulating and managing the system's reserves, adopts regulatory and supervisory roles over competing banks, and it establishes reserves and regulatory relationships with them.

Unfortunately, according to Goodhart (1987, 1988), because of inherent and deep conflicts of interest between its previously for-profit role and its new nonprofit (public) role as interbank coordinator of reserves and lending, and regulator of commercial banks, a bankers' bank will have to become a *noncompetitive* (state-led) central bank to better play the new social and systemic role; reflecting the public interest of safeguarding the entire banking system and its reserves. A monocentric and noncompetitive central bank, then, Goodhart claims, seems to be a natural and necessary institutional outcome of commercial banks' inherent tendencies to concentrate, and economize on, reserves in a single for-profit banking entity.

This section will now scrutinize and challenge this natural evolutionary account by reviewing the key historical events (the original charter, plus the two following charter renewals) that led the Bank of England to become the bankers' bank of the entire English system (see table 1 in page 106 for a summary of the Bank of England charters). This section indicates that what Goodhart believed to be a natural and generalized evolution of central banking is in reality an unintended and emergent institutional effect of a *specific* political-economic dynamic entanglement process initiated by bank bargains between political organizations and a commercial, largely for-profit bank. The entanglement process in England led the Bank to gradually accumulate nonmarket (polity) characteristics and therefore to gradually become a polity–economy hybrid (Broz and Grossman, 2004).[82]

The bank-charter model began with monarchs needing to finance the creation of their international expansionary domains. Most successful empires used charter monopolies on different business activities as a way to subcontract and finance colonization (Calomiris and Haber, 2014, chapter 3). The bank charters allowed the banks involved to benefit from unique legal privileges and nonmarket features while furthering the financial and colonization goals of the state. In the case of England, after the Glorious Revolution of 1688, King William III needed resources to finance the war against Louis XIV of France (Dowd, 1993). To do so while constrained by Parliament, he had to rely on corporate and chartered entities as an important part of funding long-term debt for war efforts.

The Financial Revolution (1693–1720) undertaken by Parliament allowed the English state to replace costly and unpredictable short-term floating debt with predictable and funded long-term loans secured by sector-specific revenue streams. Chartering a bank in exchange for long-term credit was part of that innovation, which also helped reduce credit transaction costs, improving the monarchs' financial situation and capacity to leverage and borrow in the long run (Broz and Grossman, 2004, 54; North and Weingast, 1989). This process of 'incorporation of the public debt' (Philippovich, 1911) established a series of monopoly charter schemes by which government incorporated potential state creditors into joint-stock companies to have access to a stable pool of creditors.

[82] Because of length constraints, I review only the earliest, and most important, chartering bargains (the original charter and the two following recharters), which conveyed and explain the major nonmarket characteristics attributed to the Bank (Smith, 1990 [1936]). Additionally, in section 4.3, I also review the period 1797–1821, characterized by suspensions of gold payments (the ceased of redemption in specie) and the *de facto* legal tender status of the Bank's notes.

These chartered companies were founded to provide funded loans and credit to the English monarchs in exchange for monopoly deals and corporate privileges. One of the first of these deals was with the 'Governor and Company of the Bank of England' in 1694, as proposed by entrepreneur William Patterson (Broz, 1998). Unlike the other two chartered companies (the New East India Company and the South Sea Company), the Bank was the only chartered company able to survive in close entanglement with the government for centuries. Between 1694 and 1844, the Bank's charter was renewed nine times. The renegotiations and agreements that perpetuated and enlarged the Bank's entanglement in the economy reflected contextual and *ad hoc* economic and political uncertainties unfolding through time and the different bargaining powers possessed by the involved parties (Broz and Grossman, 2004). This section will now review the early evolution of the Bank in line with the dynamics of bank bargains and political entanglement as defined in section 4.1.

A parliamentary act initially established the Bank with an expiration date, critically suggesting the *lack* of a serious compromise (or vision) among the involved parties to create a robust joint-production public institution to provide critical public goods and services in the long run. The Bank was originally chartered only for eleven years with initial capital of £1,200,000, which was immediately lent to the government at 8 percent (Broz and Grossman, 2004). As part of the initial bargain, the government authorized the Bank to issue notes in the same amount (Smith, 1990 [1936]). The charters had explicit expirations after which Parliament could dissolve the Bank through exercising an option with a one-year notice by repaying its loan. Thus each charter renewal, until 1844, extended the lifespan of the Bank for a limited time only.

Furthermore, these renewals occurred at irregular intervals and always earlier than the original expiration date of each charter, reflecting the necessity of both parties to negotiate, bargain, and enhance the entanglement (Broz and Grossman, 2004). The Bank's charter was never dissolved; it was renewed nine times by Parliament between 1694 and 1844, the date of the last Continuance Act. Indeed, 'during the century and a half following the Bank's founding, charter renewals were a recurrent feature of the Bank's life' (ibid., 50). Hence, unlike what the joint-production literature suggests (Broz, 1998), the 'early history of the Bank was a series of exchanges of favours between a needy Government and an accommodating corporation' (Smith, 1990 [1936], 12). Moreover, it is this 'recurrent feature' within the Bank's early life that ended up transforming the Bank from a commercial, yet privileged, for-profit corporation into a non-profit central bank.

The original bargain culminated in the creation of the 1694 Bank charter as an 'incomplete contract' that reflected the relative bargaining power of each party.[83] The original charter was the product of a mutually beneficial political-economic exchange between the government and the Bank's shareholders 'designed to ensure that the parties remained mutual hostages to an initial incomplete contract' (Broz and Grossman, 2004, 58). This is the initial relationship that created an entangled link between the two types of organizations. Consequently, the first Bank charter established endogenous bargaining *flexibility* and malleability in a 'contracting under uncertainty' outlook; thus opening the path for further interactions, bargains, and deeper entanglement through time.

Subsequently, the British government benefited from the rechartering process and option features of the incomplete contract in order to bargain and adjust the original agreement in response to unexpected changes in its fiscal and political environment. The Bank's managers, meanwhile, used the charter renegotiations also as a mechanism to protect themselves from unfolding competition (ibid., 51). Accordingly, the 'renegotiation clause thus gave the parties the flexibility to adjust the contract to changed conditions' (ibid., 53). Adaptable bargains renewing the limited Bank charter then allowed both parties the flexibility to endogenously and constantly incorporate into the exchange process unfolding exogenous uncertainties, both from competitive market forces (competing banks) and international political and war pressure (competing states and empires).

[83] Readers interested in an overview of the theory of incomplete contracts can consult Tirole (1999).

Thus 'the rechartering process reflected the needs of both the government and the Bank of England to respond to unforeseen contingencies' (ibid., 53). A substantial part of the bargain was then *the flexibility* to increase entanglement by eroding market pressures and competition via renegotiating the charter at the involved parties' discretion. The first charter allowed the government more long-term capacity to borrow, smoothing the cost of higher war expenditures and allowing the Bank's coalition of shareholders to profit from government-created extra-market rents and benefits (Broz, 1998; Calomiris and Haber, 2014).

It is important to notice that the first original charter reflected no intention of establishing a robust and long-term central bank in any form (Broz, 1998; Smith, 1990 [1936]); nor was it intended to substantially affect the shape and form of the entire banking system and to concentrate the English banking system's reserves into a monocentric structure. Indeed, the Bank 'received no exclusive privileges in its initial 1694 charter beyond making the notes of the Bank assignable by law' (Broz and Grossman, 2004, 55). However, the first charter *did* establish a flexible bargain that set in motion the dynamic process of renegotiating renewals among the involved parties, enabling the entanglement process to unfold, which has in fact impacted the English banking system up to today. This first charter then established the path between the polity and the economic organizations by which the polity's characteristics could be further transmitted to the Bank through renegotiations of the charter. This altered the structure of banking property rights and eroded the Bank's market order, leading to its transformation into a hybrid entity.

4.2.1 The Bank of England's two rechartering bargains and further entanglement

The two subsequent charter renewals, in 1697 and 1708, resulted in further entanglement. They were mainly driven first by the increases in the government's budget deficit due to war financing and second by competitive banking pressures from the market ordering (Broz and Grossman, 2004, 54–55). In the original 1694 charter, the Bank was granted the following extra-market characteristics: the right to form a joint-stock company with limited liability, the right by Parliament to conduct a banking business (in the first charter, this was not an exclusive right), and the right to issue notes in the amount of the Bank's capital (Broz, 1998). Thus the Bank was formed as a corporation with regular shareholders entitled to dividends from the profits earned through the regular interest payments on the loans by the government and through the nonmarket benefits granted by the charter.

The major extension and transmission of monopolistic and nonmarket characteristics mainly came from two crucial rechartering (bargaining) processes: first in 1697 and then in 1708 (see table 1 in page 106 for a summary of the Bank charters). These bargains can be seen as dynamic ones in which a political entity and an economic entity (rent-seeking group) contract under uncertainty in the form of an incomplete contract (Broz and Grossman, 2004). Importantly, the initial (1694) contract included the possibility of *renegotiating* the charter in order to adjust to unfolding uncertainty in the government's fiscal and credit position and shifts in the bargaining powers of the contracting players, as contingencies and challenges arose in both the contestability and competition of the banking system and the government's needs to support war efforts.

The 1697 and 1708 charter renewals then were used as a crucial mechanism to adapt the original 1694 incomplete contract to unfolding war, political, and market uncertainties, in turn exacerbating the political entanglement of the banking system. Indeed, the extensive and distinct monopoly privileges granted to the Bank came only with the recharters of 1697 and 1708 (Broz, 1998). The original charter was designed such that the entangled parties became mutual contracting hostages (which in turn was the core of the continued entanglement) to the incomplete contract (Broz and Grossman, 2004, 58).

Consequently, the first three charters (1694, 1697, and 1708) then established the main properties of the incomplete, yet self-adapting and highly flexible, contract, which allowed both parties to remain entangled and survive as mutual hostages to contingencies and unforeseen challenges through time. This symbiotic-

contractual situation led the parties in the original bargain to subsequently collaborate in 1697 with the first Continuance Act, when Parliament extended further and important nonmarket privileges in exchange for further credit and war financing. This rechartering process eventually led to the establishment of the English central bank.

The monarch needed to negotiate the first renewal in 1697 since war pressures had increased the budget deficit through time (Broz, 1998). Moreover, there were further market pressures stemming from the upcoming chartering of the Land Bank. These pressures pushed the Bank of England to pursue further entanglement in order to seek barriers to entry of potential new-chartered banks.[84] The Bank of England's original 1694 charter did not limit the ability of Parliament to charter additional, competing banks. But soon after Parliament acted opportunistically on this ability in 1695—when it attempted to charter the Land Bank—the Bank demanded an earlier renegotiation of the charter in 1697 so that the government could commit itself to enforcing a legal Bank of England chartered monopoly. Hence the idea was to use the flexible bank bargains to update and improve the former incomplete contract in order to adapt to the new market and political contingencies.

Table 1: Summary of the Bank of England Charters, 1694–1844[85]

Date of Actual Charter	Years of Actual Duration	Original Time to Final Option (Years)
1694	3	11 (1705)
1697	11	13 (1710)
1708	5	23 (1732)
1713	29	29 (1742)
1742	22	22 (1764)
1764	17	22 (1786)
1781	19	31 (1812)
1800	33	33 (1833)
1833	11	22 (1855)
1844	Indefinitely	11 (1855)

Sources: Andréadès (1924), Clapham (1944), Broz and Grossman (2004), Acts of Parliament

This new round of bargaining culminated in the first 1697 Bank rechartering, known as the Continuance Act, which increased the Bank's nonmarket and polity characteristics—for example, by increasing its note-issuance capacity and giving it a monopoly over managing government accounts and balances. The latter was 'a provision that added considerably to its prestige' (Smith, 1990 [1936], 12). Even more importantly, in response to the Land Bank charter (see footnote 62), the Continuance Act stated that 'no other Bank or Constitution in the nature of a bank [shall] be erected or established, permitted or allowed

[84] In 1695, Parliament opportunistically allowed the chartering of a rival bank called the Land Bank, which was a banking rival and of much concern to the Bank. This unexpected legal precedent deeply challenged the Bank's profitability and its preferred and monocentric political position. This pushed the Bank's managers to seek a renegotiation of the bargain *earlier* than expected (only three years after the original charter) in order to obtain *legal exclusivity* in the recharter and thus prevent future potential Land Banks from challenging the Bank's hegemonic and political position (Clapham, 1944, 47). Interestingly, only two years after Parliament had established the Bank of England, it attempted to replace it with a national Land Bank, thus precipitating a political "battle for the Banks"' (Rubini, 1970, 693). For further details concerning the chartering of the Land Bank and the political struggle between the Bank of England and the Land Bank consult Rubini (1970).

[85] Broz and Grossman (2004) provided evidence showing that through the years, renewal timing reflected increasing necessities of each party to renegotiate the bargain and incorporate unfolding market and fiscal uncertainty. They found evidence showing that the government's motive for rechartering was primarily fiscal. Indeed, 'recharters that took place more than a decade before the option date of the previous charter seem to have been motivated by substantial government deficit' (ibid., 53). The probability of early rechartering 'increased as fiscal deficits, most likely unanticipated and war-related, increased. . . . [A] new charter was more likely when the Bank appeared to be earning excessive rents from its monopoly privileges' (ibid., 53). On these incentives to recharter see also Calomiris and Haber (2014).

by Act of Parliament during the Continuance of the Bank of England'. The first renewal stated also that the Bank's profits were exempt from taxation, and it gave the Bank the nationwide legal monopoly on using limited liability in banking. This last feature was a new and special nonmarket privilege denied to competing banks for one and a half centuries (Smith, 1990 [1936]).

The 1697 rechartering process allows us to understand the entanglement that the first Bank bargain of 1694 had started. When new market and political forces threatened the Bank's position and expected profitability (such as the establishment of the Land Bank or other potential competing bank charters), its managers sought ways to mend the incomplete original contract (see footnotes 62 and 63). Hence only three years after its inception, the Bank renegotiated the charter in order to incorporate these unfolding market threats (the potential establishment of banks similar to the Land Bank). The renegotiation thus further degraded the Bank's market boundaries and economic characteristics.

A second crucial example of how the incomplete contract was 'improved' by increasing entanglement between the parties came along with the second recharter (in 1708). During that time, the joint-stock-company business model was spreading through different markets (Smith, 1990 [1936]). This new business model clearly challenged the Bank's position because of the innovation in corporate governance that could have made it possible for original owners to employ less personal capital, to establish banks faster, and to disperse risk over more shareholders. Thus the joint-stock-company business model could have increased the degree of contestability and competition in banking, while keeping systemic risk contained (Goodspeed, 2016).

At the same time, during the War of the Spanish Succession the British government was looking to extend its loans and credit capacity, and saw its financial needs increase. In exchange, the government offered the possibility of a second recharter. The recharter of 1708 had the objective to restrict competition in banking through limiting the capacity to use the joint-stock-company business model in opening new banks. The accumulated privileges until then gave the Bank a unique politically oriented and nonmarket position of prestige, which other banks found difficult to compete with, especially in the Bank's core lines of business (Smith, 1990 [1936]).

Because of the potential pressure of competition, the Bank sought to move further away from the competitive market order since it realized that the 1697 recharter had failed to foresee the rise of business innovations such as unincorporated private competitors. The second recharter thus gave the Bank a monopoly through prohibiting other firms and banks to form associations of more than six partners to carry out banking businesses in England and by reaffirming previous prohibitions (Broz, 1998). This restriction upon the maximum number of partners severely raised risks and barriers to entry, and lowered competition and the whole contestability of the banking system. This second recharter was crucial in restricting banking competition and contestability since issuing banknotes—while pooling risk—was the major source of bank funding and sustainability (White, 1984; 1989a, 73).

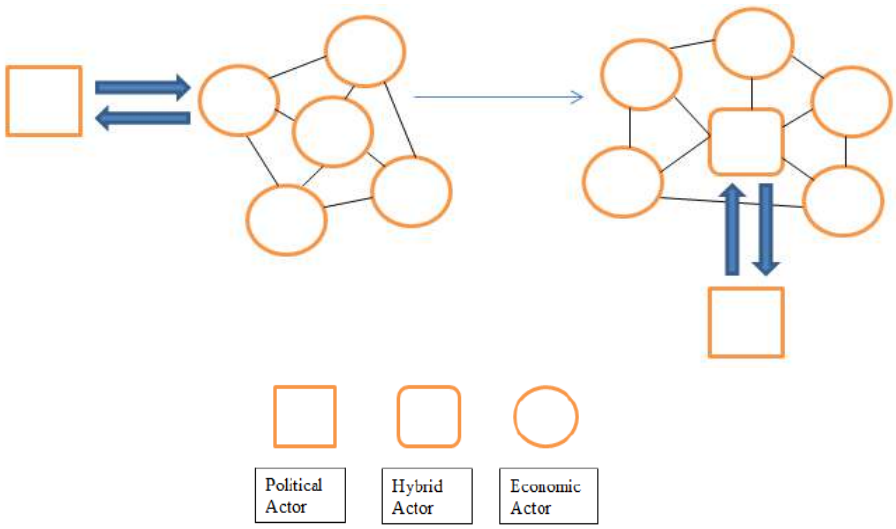
Since the Bank regarded its de facto paper-currency monopoly as critical for its profitability, managers were 'willing to make financial concessions to the government in order to protect and extend it' (Broz and Grossman, 2004, 57). Moreover, the de facto monopoly over joint-stock banking and the severe limits upon note issuance and other banking activities by partnerships of more than six partners (a monopoly and limit reaffirmed and strengthened in 1742) severely undermined banking competition for over a century (White, 1984). The 1708 rechartering fits the general pattern predicted by political entanglement (Patrick and Wagner, 2015; Wagner, 2017). Once the bank bargains started in 1694, it was in the involved parties' interest to seek further entanglement by updating the original incomplete contract in response to their unfolding political and commercial needs and challenges.

It is important to note that the Bank's entanglement did not come during times of economic crisis or from a strictly formal regulatory interaction between the parties, as most of the public choice and

entanglement literature indicates (Patrick and Wagner, 2015; Salter, 2014a; Smith, Wagner, and Yandle, 2011). The entanglement process can originate also through the dynamics of banking bargains in the form of *open-ended* charter renewals based on incomplete contracts. As long as business innovations, competitive markets, and political-legal developments threatened the Bank's position and market profitability, it led to renegotiations at irregular intervals, allowing the Bank to escape from the market ordering and move toward a dynamic entanglement of common polity ordering and a hybrid political structure. This entanglement continued throughout the charter renewals, as depicted in figure 3 below.

The chartering processes reviewed were the major drivers by which the polity organization transmitted nonmarket and political-ordering properties to the Bank in exchange for credit and lax financing of the public debt, placing the Bank in a unique and central position within the banking system (see figure 3). Moreover, because of the incompleteness of the contract in the face of political uncertainty, the additional and unexpected nonmarket properties granted to the Bank were flexible, additive, and *contextually dependent* upon business developments, innovations, market competitiveness, and the international political order of the time, which indicates that the Bank and the polity had incentives to seek such properties and entanglement as those unforeseen events came about.

Figure 3: The Dynamic Entanglement Part I, Government and Bank Bargains[86]



The ad hoc and contextualized nature of the adaptation of the original Bank charter as an open-ended (undesigned) institutional evolutionary response to unfolding market challenges and political contingencies deeply challenges Goodhart's and Congdon's rationalistic claims concerning the natural, general, and inherent evolution of central banks. Additionally, it is important to underscore that every single Bank of England charter 'contained a renegotiation clause that gave the parties the flexibility to

[86] Figure 3 depicts, in a simplified manner, the process of dynamic entanglement between Parliament and the Bank of England. The square on the far left side represents the political entity (Parliament) that enters into bank bargains with a single for-profit banking entity (the original for-profit Bank). Surrounding circles represents other commercial entities such as banks. The left side represents the process of bank bargains, in which the political entity conveys political favors and nonmarket (monopolistic) properties with a single commercial bank in exchange for credit and lax forms of financing the public debt. The bidirectional arrows between the square (Parliament) and one of the circles (the for-profit Bank of England) represent the original bank bargains and charter-renewal negotiations between them that initiated the entanglement. It is through those bargains and exchanges that the political entity starts to transmit special nonmarket characteristics into the previously market-oriented and for-profit Bank. As the process of entanglement continues through time, the Bank becomes increasingly entangled with the government, acquiring ever-growing nonmarket characteristics, because of the rechartering bargains and because of the need for new credit and better ways to finance the ever-expanding war efforts. The right side of figure 3 represents this new, unintended institutional development, in which the Bank slowly becomes a nonprofit/for-profit hybrid bankers' bank (represented by the center square with round edges) that concentrates the reserves of the banking system (the other circles) and possesses several nonmarket properties.

adjust the initial bargain to changed conditions. . . . In short, the Bank of England was not made a permanent institution due to problems of incomplete contracting. The rechartering process mitigated these problems' (Broz and Grossman, 2004, 58).

The point above is important because the fact that the bargains were highly contextual, flexible, and ad hoc, along with the fact that they and the Bank changed dynamically and *unpredictably* through time to deal *ex post* with unforeseen contingencies, further challenges Goodhart's (1988) and Congdon's (1981) rationalistic and functional claims about the establishment of central banks as rational institutional solutions to severe banking challenges. Indeed, the Bank's unexpected transition from a largely for-profit and private structure with a *clearly defined* expiration date to a definitive and permanent nonprofit central bank was actually the unintended and emergent institutional outcome of the growing entanglement and symbiotic contractual adaptation between Parliament and the Bank through time (Bagehot, 1873).

This transition is represented graphically in figure 3 above, which shows how the Bank transitioned from a for-profit structure (left side of the figure) to a bankers'-bank hybrid that provided, unwillingly, some banking and regulatory services (e.g., managing the concentration of reserves) while still being also partially a for-profit banking entity (right side of the figure). Hence, figure 3 depicts graphically also how the first three 'charters of the Bank—and indeed, the process generating these charter—had important [institutional] consequences. The economic privileges the Bank secured in recharters . . . helped propel its rise to a modern central bank' (Broz and Grossman, 2004, 71; see also footnote 64).

To conclude this section, note that the overall and systemic unintended consequence of this gradual entanglement process is that other privately ordered (for-profit commercial) banks acknowledged and understood the severity of the entanglement, which granted a special political and economic prestige and new managing roles to the hybrid Bank (Fetter, 1965; Philippovich, 1911). The nonmarket and polity characteristics acquired by the Bank so undermined the competitiveness of the banking system by the early eighteenth century that other commercial banks were either pushed out of the banking business or succumbed to the Bank of England's special strategic and dominant position within the English banking system (Smith, 1990 [1936]). The Bank thus gradually became a hybrid bankers' bank that extended the entanglement between the polity and the economy to the rest of the English banking system by concentrating the reserves of commercial banks of the entire system within it. This concentration of reserves led the Bank to (unwillingly) become also a lender of last resort for the entire English system, further exacerbating the entanglement among all parties.

4.3 Institutional Evolution and Central Banks as Unintended Consequences of Entanglement

The key to understanding the Bank's evolution from a hybrid to a definitive central bank resides in how the entanglement, embodied in charter privileges and legal precedents, incentivized also the additional and larger dynamics of the banking system's concentration of reserves (Smith, 1990 [1936]). These privileges aforementioned in the previous section led to the Bank's notes becoming the principal reserve medium. Through entanglement, the Bank involuntarily came to possess a unique intangible asset: other banks' recognition that it held unique extra-market and hegemonic properties. This recognition added to the Bank's prestige, security, and value, which lowered its cost of funding and its perceived financial riskiness (Broz, 1998; Smith, 1990 [1936]). This key financial and political position incentivized the smaller banks' practice of keeping balances and reserves with the Bank, which gradually increased and concentrated the banking system's reserves.

As the monopolistic London issuer of notes, the Bank came to possess hegemony over the English currency system (Selgin, 1988). The extra-market sphere gave the Bank the possibility to expand its business, increasing in size and financial security. This added an extra-market competitive advantage to the Bank's notes over privately ordered banks' competitive notes (Dowd, 1993, 222). Competitive banks acknowledged the Bank's new relevance and politicized extra-market structure and started treating the

Bank's notes as their new reserve medium instead of gold (Broz, 1998).[87] These reserve activities were more convenient and safer for competitive and country banks since leaving part of their cash and gold reserves with a single entangled entity, isolated from market pressure and economic crisis, reduced business and banking risk and economized the use of reserves at a low cost and low political risk.

Normal commercial country banks recognized that the special bank (the Bank of England) holding their reserves would, under any circumstance, be able to provide those reserves either in money or as a reserve medium (Bank notes) that would be accepted anytime by the public and other banks (Goodhart, 1988). The competitive banks' economic rationale for recognizing the Bank's entanglement and hegemony is crucial in understanding the entanglement's unintended effects: it affected the competitive banks' incentives and decisions to relentlessly concentrate their reserves, and therefore it affected also the Bank as it became, unwillingly, a central bank (see also footnote 69). This process of specie and reserve convergence into the Bank was further reinforced with key legal episodes and political decisions enacted between 1797 and 1821 (see below).[88] Thus, the gradual accumulation of the banking system's reserves in the bankers' bank was mainly incentivized by the entanglement and political signaling process between 1797 and 1821.

When the Bank became entangled with the government, at certain times it suspended gold payments, it established legal precedents for the de facto legal tender status of its notes, and its notes were finally declared legal tender for all payments in 1812 (Smith, 1990 [1936]). This *suspension period* (1797-1821) allowed the emission of political signals and the accumulation of political and legal precedents that encouraged and secured the bankers' bank's banknotes and their status (the Bank's notes), which could be guaranteed to be accepted throughout the country as a medium of exchange and of payments.

Hence the further entanglement via *both* rechartering monopoly powers and the political signals and legal precedents during the suspension period of 1797–1821 led the Bank to increase in size, security, prestige, and uncompetitive powers that set it drastically apart from the competitive market ordering (see figure 3 above). The above process severely undermined the profitability of competitor banks and incentivized (forced) them to accept the Bank's new political-economic-ordering hegemony through using the Bank's notes as the main reserve medium on which to reissue their own country notes, which of course reinforced the concentration of reserves and furthered the entanglement of the whole English banking system.

Consequently, the following events between 1797 and 1821 played a significant role in the entanglement process since government actions and legal precedents, *beyond* the original bargains reviewed, also enhanced the entanglement. This period is important in understanding how the Bank ultimately became the bankers' bank by significantly accumulating reserves. By the outset of the Napoleonic Wars, in early 1797, because of excessive government borrowing and persistent fears of a French invasion, the Bank had come under severe economic pressure regarding its reserve positions.[89]

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[87] Since the Bank's notes were deem safe and less costly to store and move compared to gold reserves, customers also preferred Bank notes as reserves on their own bank deposits. Moreover, because of the Bank's extra-market capacities and privileges, it was the only bank that could have offered notes *as secure as* gold as redemption media for bank liabilities even at times of crisis (Dowd, 1993, 224).

[88] The period between 1797 and 1821 is known as the Restriction Period (see Fetter, 1950).

[89] In 1797, because of the Bank's endangered reserve position, the English government declared suspension of payments in cash (specie) for the Bank's notes. The Bank's suspension of payments was made official in 1797 by an official act of Parliament in order to meet a critical situation in which the Bank was faced with an incipient bank run. This legal precedent, enacted by the government, was a crucial signal of political entanglement; it 'amounted to a legislation of the bankruptcy of the Bank, and it created a precedent which led the public in future always to expect the Government to come to the aid of the Bank' (Smith, 1990 [1936], 15). After the passing of the 1797 Bank Restriction Act, the entanglement between the government (led by British prime minister William Pitt the Younger) and the Bank became so evident in the eyes of the public that Richard Brinsley Sheridan publicly bewailed the way the Bank had fallen under the negative influence of the prime minister. Sheridan described the Bank of England as 'an elderly lady in the City, of great credit and long standing who had unfortunately fallen into bad [political] company'. This remark subsequently led to James Gillray's renowned cartoon entitled *Political*

During the Napoleonic Wars, the British government released an Order of Council that prohibited the Bank to redeem notes in gold in order to finance the war—thus prohibiting the Bank from issuing (redeeming) more specie in exchange for its notes (Broz, 1998). This Order of Council subsequently led Parliament to pass an act on May 3, 1797, known as the Bank Restriction Act, that legally allowed the suspension of payment in specie (cash and gold) of the Bank's notes, de facto legalizing the Bank's bankruptcy (Dowd, 1993; Smith 1990 [1936]). This initial and unique exemption from paying (redeeming) the Bank's notes in specie was to be *repeatedly* renewed throughout the Napoleonic Wars and for several years afterward.

In this case, the contractual and political obligation of the Bank's charter to provide ever-growing government financing, at restricted (capped) interest rates, to the government in time of crisis and war *overrode* the Bank's original commercial commitment and promise to the maintenance of specie convertibility of its notes (Capie et al., 1994, 8). The erosion of the Bank's specie and gold reserves and its incapacity to maintain convertibility of its notes were clearly associated with wartime uncertainties and with the government's volatile and growing fiscal pressure. The Bank's managers then had also strong incentives, and convincing arguments, for pressing the government to discharge their original commercial obligation of converting the Bank's notes into specie for their costumers. This was performed by making the notes of the Bank de facto legal tender, and thus instituting *cours forcé* (ibid., 8–9; Smith 1990 [1936]).

The Napoleonic Wars between 1792 and 1815 brought about a period of suspensions of convertibility of the Bank's notes in England. The suspensions of convertibility 'reinforced the tendency for the other commercial banks to hold central bank liabilities, notes and deposits, as their main reserves, rather than holding their own stocks of specie in coin or bar'. Hence 'granting [de facto] legal tender status to the notes of the central bank did bolster its primacy among other commercial banks, since their notes were not given similar status' (Capie et al., 1994, 8).

The 1797 act thus created a crucial legal precedent by which the public and competitive banks started to expect that the government would continue acting this way, giving a special status to Bank of England notes (see footnote 67). This gave the Bank's notes de facto partial legal tender status (Dowd, 1993, chapter 11). Indeed, after a severe depreciation of the pound after 1800 and of the Bank's notes during 1809 and 1810, the government declared the notes official legal tender in 1812 through Lord Stanhope's Act, which further reinforced the entanglement process (Smith, 1990 [1936]). These political and legal precedents had severe unintended institutional implications since they changed the legal and economic status of the Bank's notes throughout the country. Therefore 'country banks began to look on them [Bank of England notes] as backing their own note issues' (Smith, 1990 [1936], 16).[90]

These legal precedents and signals during 1797 and 1812 further exported additional nonmarket characteristics to the Bank and also gradually to the whole English banking system. The suspensions of payments (the Restriction Period) and the transitory legal tender status of its notes released the Bank from any competitive banking and customer pressure and obligation to redeem their notes in gold, which increased its outside (polity) nonmarket sources of profitability. The government's repetitive interventionist signals, and its assurances that the Bank's notes would be good for all legal and commercial payments and thus accepted by the public at large, also significantly assured the other competitive banks of the Bank notes' *superior* nonmarket economic and legal status, again furthering the entanglement of

Ravishment; or The Old Lady of Threadneedle Street in danger!, which curiously depicts Prime Minister Pitt seducing (entangling) the Bank of England, personified as an old lady dressed with £1 and £2 notes, for her fortune.

[90] The Resumption Act eventually eliminated the prior (1812) exemption of the Bank notes' legal tender status on May 1, 1821, fully renewing (reestablishing) specie payments and convertibility in 1821. However, the accumulated legal precedents and political signals (between 1792 and 1821) had already generated expectations that the British government would behave again in this entangled manner (indeed, in 1833 the Bank's notes again became legal tender). This unique political situation and signals increased the overall system's entanglement, and commercial country banks started to see it as customary to treat the Bank's notes as their own reserves in lieu of gold even after the Restriction Period ended. This new set of political expectations encouraged the Bank to hold further concentrations of system reserves and adopt a special bankers' bank role.

the rest of the banking system via the furthered process of concentration of reserves within the Bank of England.

Hence the combination of monopoly powers and extra-market characteristics granted through the charter renewals (see previous section), alongside the 1797–1812 additional suspensions of payments and the legal restrictions (the so-called Restriction Period), increased the Bank's hegemony, size, financial security, and legal power, making it the dominant bankers' bank within the system. Hence the strong and visible entanglement between the Bank of England and the government *politically conditioned* the centripetal forces of the concentration of reserves of the entire system, guiding them toward the unique entangled entity. In other words, the institutional tendencies of the English banking system, usually shaped economically by economies of scale in reserve holding, were in this particular case largely affected also by the political entanglement between the Bank and the British government.

Given the suspensions of payments, de facto legal tender status, and other political signals, and given the Bank's superior and hegemonic position, it is no wonder that the normal process of concentrating reserves along the banking network—usually undertaken in order to reduce commercial banks' operational and clearing costs—was severely conditioned by that unique and hegemonic entity (see also footnote 68). In other words, the natural tendencies of banks to economize on resources and reserves and to concentrate their reserves and specie in different nodes within the banking system (Dowd, 1993; Selgin, 1988) were severely conditioned and guided by the entanglement process between the Bank and the government, which led those natural and economic forces of banks to be exceptionally concentrated upon a single entity. If the entanglement between government and the Bank had *not* taken place, then those politically distorted economic tendencies would have never arisen (Bagehot, 1873).

In this exceptional case, private banks had both the legal commitment of the government and the monopoly bank assuring them that the Bank of England would provide and issue a reserve medium at any time if needed. Indeed, given the close collaboration among the entangled parties, the repetitive successes of the rechartering bargains (seven up until 1812), and the legal precedents between 1797 and 1812, 'the market apparently viewed a successful recharter as signal that the voluntary "rents-for-loans" bargain . . . would be maintained' (Broz and Grossman, 2004, 53). The legal precedents and interventionist signals between 1797 and 1812 incentivized commercial country banks to economize on gold reserves and specie, and to treat the Bank's notes as if they were *as good as* gold itself in order to issue their own notes and hence to park their gold and (cash) reserves with the bankers' bank.[91]

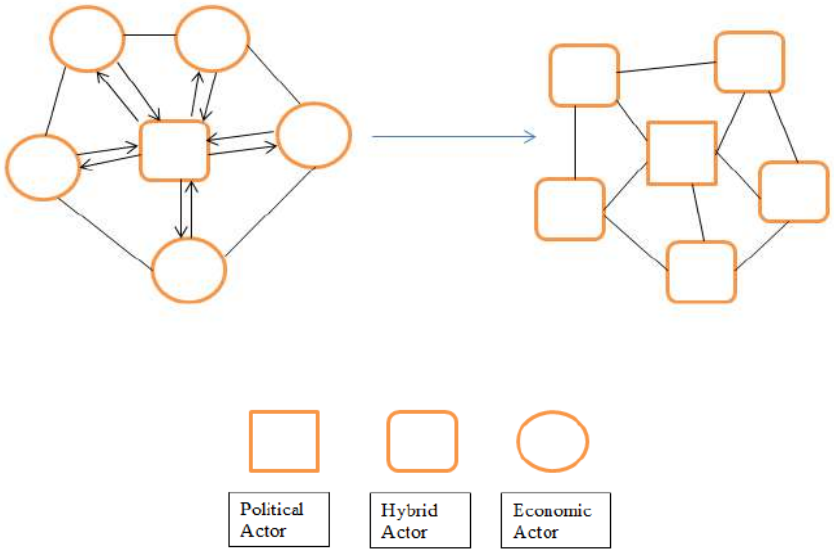
Since the Bank of England was the only entangled banking entity outside the market ordering, unconstrained to supply notes and free to suspend payments (redeemability) in gold if needed, it exacerbated and politically directed the process of concentration of reserves exclusively within it. Hence the entanglement's 'natural', but unintended, outcome was that commercial country banks in England gradually accepted the Bank's liabilities, instead of gold, as their exclusive medium of reserves, which led the Bank (unintendedly and also unwillingly) to gain control and responsibility over the total level of reserves throughout the entire English system (Dowd, 1993; Smith, 1990 [1936]).

Consequently, this politically distorted and entangled process of the gradual concentration of reserves critically associated and linked the Bank's monetary and credit policies and actions with the commercial banks' capacity to further expand credit and their own note issuance; thus unintendedly giving the Bank of England indirect power and control over the overall level of liquidity and the expansion of credit and the money supply in the English banking system (Capie, et al., 1994, 63).

[91] As Dowd (1993, chapter 11) pointed out, it would have been economically inefficient for a competitive bank to redeem its liabilities in gold if it could in fact, and by law, use the Bank's notes of the same nominal value, which were actually sold at a discount against gold. Indeed, the Restriction Period led to a severe depreciation of the Bank's notes against gold, but their de facto legal tender status nevertheless led to a sort of Gresham's-law process driving gold out of circulation in the English system and leaving it operating under a de facto inconvertible (fiat) currency system (Dowd, 1993, 341; Fetter, 1950).

This by necessity forced commercial and country banks to acknowledge the Bank's hegemony while incentivizing them also to lower their provisions of reserves (and to become less prudent), thus further extending the entanglement's moral hazard throughout the entire banking system (see figure 4 below). Accordingly, the English banking system after approximately 120 years since the Bank's founding, now suddenly depended upon the polity-hybrid signals generated by the Bank's unilateral and political (and highly unpredictable) monetary actions, instead of market signals and banking competition, to adjust its levels of liquidity and overall reserves in order to expand money and credit accordingly to demand.

Figure 4: The Dynamic Entanglement Part II, Concentration of Reserves[92]



This rather exceptional, vertical, and gradual concentration process severely eroded market discipline, increased moral hazard, and eliminated previous (existent) market-banking and competitive signals used effectively throughout commercial banking in England (Calomiris, 1990). Thus, as Bagehot intuited,

> with so many advantages over all other competitors, it is quite natural that the Bank of England should have outstripped them all. . . . Thus our [concentrated] one-reserve system of banking was not deliberately founded upon definite reasons; it was a gradual consequence of many singular events, and of an accumulation of legal privileges on a single bank. (Bagehot, 1873, 66–67)

[92] The left side of figure 4 shows the gradual process, performed by commercial banks (represented by circles), of accumulating and concentrating their gold reserves within the Bank of England (represented by the center square on the left). In that concentration process (represented by the arrows between the circles and the center square), competitive market-oriented banks started to concentrate their gold reserves and specie within the Bank and to use instead only the Bank's notes as their own reserves on the basis of which to subsequently issue their own notes. This was a crucial aspect of how the entanglement process spread throughout the rest of the banking system. The right side of the figure represents such spreading of the entanglement from the Bank of England (represented now by the center square) toward other commercial banks (represented now by squares with round edges). Through the sole use of Bank of England notes as main reserves of the system, in order to expand overall money and credit, the Bank of England now introduced polity and nonmarket characteristics into other commercial banks, eroding previous market, banking competitive, and credit signals that had efficiently controlled and guided the private banks' risky behavior and the correct supply of money and credit of the system. Commercial country banks therefore started to respond and adapt to the Bank's entangled signals and its unpredictable political- and war-related financial actions concerning the supply of its notes (polity signals) rather than respond to customers, competition, and market signals (the economic ordering), thus becoming entangled as well. This concentration of reserves created also new systemic moral-hazard problems, while a single hybrid bank started affecting the commercial banks' overall level of reserves, risk and financial strategies, and local monetary actions. Given this new systemic moral-hazard problem, related to the concentration of reserves, the Bank had to become unwillingly a lender of last resort.

The fact that the whole English banking system gradually started using the Bank's liabilities as reserves implied that the Bank had to assume a new central position in the entanglement process. This unintentionally also allowed the Bank to further erode the previous market signals and commercial ordering of the banking system, to unilaterally affect the total level of reserves in the system, and thus to indirectly guide the overall supply of money and credit of the English economy.

Thus an entangled hybrid entity (now part of the polity ordering), instead of market signals and banking competition (the commercial ordering), was the ultimate guide to the supply of money and credit. The fact that commercial banks became economically entangled with the Bank through using its notes as reserves and relying upon the Bank's unpredictable decisions for liquidity exacerbated the entanglement across the network, extending the blurriness of private and common ordering as seen in figure 4 above.

The reviewed process of entanglement led the Bank of England to finally become mostly a political, *non–profit-oriented* entity, placing the Bank in an unintended and unwanted position of a hybrid between a commercial and central bank at the center of the English banking system (a banker's bank). This hybrid and highly contradictory position created severe problems and conflicts for the Bank since managing the system's monetary policy, levels of reserves, and liquidity and supervising commercial competitor banks cannot be effectively done within a for-profit competitive (and mostly private) banking structure because of severe public–private conflicts of interest (Bagehot, 1873).

Hence, without seeking it, the Bank—by the mid 19th century—gradually became a *quasi* central bank that had to assume the role of maintaining overall financial discipline, regulating bank competitors, managing the system's concentration of reserves, providing reserves and liquidity to other banks, and delivering support to bank competitors in time of crisis; thus it had to disregard its original private and commercial ordering. The Bank's ambiguous and hybrid position in fact created severe conflicts of interest and debates during the banking crises of 1847, 1857, and 1866 between the Bank's shareholders and managers, on the one hand, and the social and public need for overall banking stability and last-resort lending services, on the other (Goodhart, 1987, 1988).

Nevertheless, by the mid 19th century, the Bank rejected the idea that it had public and social financial responsibilities to provide liquidity and stability during those crises. However, a clear institutional case was developing during the nineteenth century that 'the Bank was something other than a private profit maximizing institution'. Nevertheless, 'the exact nature of the relationship continued to be debated' (Capie et al., 1994, 51). In the words of Fetter (1965, 281),

> Officially the Bank made no suggestion to the Government, and officially the Government did nothing beyond letting the Bank know it was free to break the law if it felt this necessary to carry out its public responsibilities. . . . The important thing was that somehow or the other the Government and the Bank worked things out reasonably well.

The reviewed entanglement process not surprisingly culminated with the full and obligated transition of the Bank of England from a largely for-profit, private, and competitive institution (in 1694) to a full-fledged, noncompetitive, and politically oriented central bank (by the late 1800s). The final entanglement came with difficulties and caustic debates during the last half of the nineteenth century (Capie et al., 1994; Dowd, 1993). Indeed, by the time of the Baring crisis in the early 1890s, the Bank had come to fully admit its role as proto–central bank at the core of the entangled banking network, putting its shareholders' profitability and economic interests aside in order to provide last-resort lending to endangered commercial banks (Dowd, 1993; Fetter, 1965).

Departing from its last remaining commercial and private aspects, this final institutional step of full self-recognition of the publicness and entanglement of the Bank ultimately settled the Bank's debates and full entanglement to the point that its unintended public and systemic financial role as the overseer and

manager of the reserves of the system, and thus as its *nonprofit* lender of last resort, had to be fully recognized, internalized, and substituted for its original and prior for-profit commercial ordering (Capie et al., 1994). Hence it finally 'had become the bankers' bank, a role enhanced by withdrawing from commercial rivalry' (ibid., 15).[93]

4.4 Conclusions: Toward a Comparative Institutional Analysis of Monetary Alternatives

This chapter contributes to expanding our institutional understanding of how central banks evolve, understood through a broad emergentist and political-economic perspective. This chapter has specifically focused on how bank bargains ignite and enhance the political-entanglement process of banking systems and its dynamics, without relying on narrow accounts of direct supervision, regulation, or financial crisis (Salter, 2014a; Smith et al., 2011; Wagner, 2017). According to the proposed framework, the entanglement process can upsurge through specific political-economic contract renegotiations (bank bargains), which allow polity organizations to transmit some of their nonmarket property-ordering features to economy organizations. Chapter 4 has applied this theory to the Bank of England's unintended institutional evolution.

The Bank's evolution, it has been shown, was, contrary to what Congdon (1981) and Goodhart (1987, 1988) claim, a *politically conditioned* and thus highly unnatural evolutionary example of the emergent and unintended consequences of political-economic entanglement in banking initiated by a process of dynamic bank bargains. Importantly, political entanglement and bank bargains clarify and extend Bagehot's (1873) original intuitions about the Bank's institutional evolution. They also explain how the Bank's establishment and evolution can be better characterized by the emergent and highly contextual institutional phenomena stemming from a dynamic entanglement process through the gradual transmission and accumulation of nonmarket characteristics; leading finally to a sui generis process of accumulation and concentration of reserves within a monocentric structure. This process encouraged the commercial banks to use the Bank's notes as their unique reserves and finally encouraged (forced) the Bank to become the sole lender of last resort to the English system. Entangled political economy can help us to better understand the underlying political dynamics for the establishment and evolution of *proto*–central banks throughout Europe (see also section 3.1).

Chapter 4 has complemented the institutional and historical arguments explored in chapter 3 concerning how central banks actually evolve and are established out of political exchanges, bank bargains, and political involvement with the banking sector. Taken together, these two chapters have argued that central banking functions—such as the lender of last resort—and central banks' institutional evolution are *not* the natural tendencies and inherent evolutionary developments of the competitive banking system, unlike what Goodhart (1988) assumes. Instead, and echoing Bagehot (1873), part II has shown that the evolution of central banks, their nonmarket characteristics, and their banking and centralized functions emerge as unintended and *politically conditioned* phenomena that originate during the entanglement process initiated by bank bargains and the sovereign.

Accordingly, chapters 3 and 4 have argued that the institutional rationale, origins, and evolution of early central banks are *far* from natural, rational, and economic developments inherent within the normal and competitive dynamics of banking. Hence the entanglement process reviewed further undermines Congdon's and Goodhart's generalizations concerning the natural evolution of central banks, instead supporting Bagehot's (1873) initial evolutionary intuition and conjectures. Furthermore, it is ultimately this politically conditioned Bagehotian intuition about central banks, confirmed in this chapter, which

[93] Thus, by the end of the nineteenth century, the Bank 'took steps to withdraw from commercial business and rivalry with the commercial banks . . . a process slowed by its organisation as a private sector body with a need to make profits to satisfy its shareholders. This was eventually effected in part by transforming the dividend [paid to shareholders] into a constant payment [like a coupon], unrelated to current profits, so that the shareholders [of the Bank] became transformed, in practice, into bond holders' (Capie et al., 1994, 13).

suggests a logical change of intellectual focus in banking theory toward a comparative institutional analysis of monetary alternatives.

I have suggested that the Bank's evolution is poorly understood as stemming exclusively from a joint-production rational framework (Broz, 1998, 235–236) and direct government intervention for revenue (Bagehot, 1873; Glasner, 1989). Instead, political entanglement initiated by bank bargains stresses two novel points. First, what can be seen as a direct and rational institutionalization of a chartered bank to solve collective-action problems in government financing and banking through bargains (Broz, 1998; North and Weingast, 1989) can actually lead to important institutional phenomena (such as the emergence of a hybrid bankers' bank at the core of the system) with wider institutional repercussions.

Thus the rational joint-production approach to the provision of public goods (such as easy government financing and reliable access to credit) can nonetheless create important entangled dynamics that can lead to drastic negative alterations of the institutional order of private entities and the form of uncompetitive markets. In other words, a joint-production approach illuminates the original and effective provision of a public good (such as the public creditworthiness of the sovereign through charters), but concomitantly obscures entanglement, institutional, and evolutionary details and their long-term effect on bank reserves and institutions, which arise through the dynamics within the *adjoined excludable* good produced simultaneously in the joint production process (e.g. the charters' rent-seeking and noncompetitive aspects).

Second, what may seem—prima facie—like simple and direct government intervention (Ikeda, 1997), is in reality repetitive bargains, exchanges, and participation of *both* public and private entities within a legal and constitutional framework (Patrick and Wagner, 2015). The Bank of England is one of those unintended emergent cases of political exchanges: it was gradually entangled to become a central bank through bank bargains that were made among interested parties. Thus entanglement, based on charter renewals, is *not* solely enhanced by government or political entrepreneurs, but also by an active participation of private actors and commercial entities in the network. This recognition does not suggest that constitutional and legal limits on the capacities of polity entities to bargain and grant privileges, devised to actually mitigate potential entanglements should be discouraged (Brennan and Buchanan, 2000 [1985]). Constitutional political economy (Buchanan, 2008) might illuminate how we can alter the 'rules of the game' at the preconstitutional level in banking to avoid subsequently adjusting property and political rights in exchange for government financing (Calomiris and Haber, 2014).

Part II's core contribution has been to provide both theoretical (chapter 3) and historical (chapter 4) arguments showing that central banks are not the institutional product of inherent banking needs and natural institutional evolution of banking systems. Neither they should be conceived also as the *only* institutional way possible to overcome severe banking challenges (see also Paniagua, 2019b). Part II has scrutinized at length the proposed theoretical and historical arguments to show that central banks are neither a rational institutional response to deep banking challenges, nor the inherent product of natural historical evolution of banking systems. Consequently, and having (hopefully) settled this institutional debate, this work can now move more confidently toward an applied comparative institutional analysis of central banks and radical non-monocentric alternatives.

Importantly, given that part II has argued that central banks are not the necessary and only product of inherently natural institutional evolution of banking systems, societies *do not* carry the burden of being institutionally and unavoidably 'stuck' with relying on monocentric central banks as sole institutional solutions to severe banking challenges. Thus, they can and they should look for more resilient and robust institutional banking alternatives based on rearrangements of property rights and comparative institutional analysis. Indeed, part III will engage precisely in that comparative inquiry, expanding upon the theoretical and historical analysis of central banking provided in chapters 3 and 4, but moving toward a comparative institutional analysis of central banks with other non-monocentric alternatives.

The insights from part II concerning both the lack of a serious institutional and economic justification for central banking (chapter 3) and the fact that central banks do not arise naturally out of inherent banking dynamics—but rather as part of a politically entangled, economically altered, and highly contingent banking process (chapter 4)—suggest that the intellectual field of inquiry in macroeconomics is wide open for further explorations in comparative institutional analysis *beyond* the narrow rationale of central banking. Moreover, the arguments concerning the lack of an institutional rationale only for central banking suggest that it is time to systematically explore and take seriously radical and non-monocentric alternatives, such as polycentric forms of banking and free banking (see chapter 6 for more details, and also Salter and Tarko, 2018).

I end part II of this thesis by concluding that the exploration of diverse, and perhaps nonmonocentric, monetary-institutional alternatives is warranted in macroeconomics if we desire to ultimately promote sound reforms and robust changes to our increasingly fragile and highly politicized banking systems. Consequently, the general scope of part III will be to apply institutional analysis and political economic robustness considerations to banking orders, and a comparative institutional analysis to the realm of monetary policy. Specifically, the following chapter 5 will aim to first develop a broader framework of robust political economy for comparing monetary institutions and monetary policy, and then chapter 6 will engage in an applied exercise in comparative institutional analysis of diverse monetary alternatives.

Part III

The Robust Political Economy of Monetary Institutions

'The key question of money/macro theory is not: what determines whether aggregate demand for goods and services confronting their aggregate supply is deficient or excessive or just right? Rather it is: what determines whether or not the market process of exchange and coordination in an economy of decentralized decisionmaking works smoothly? Or, how can monetary disequilibrium impede exchanges of goods against goods, the mobilization of scattered knowledge, and the coordination of decentralized activities? . . . Questions about exchange and coordination direct attention, instead, to what background of economic institutions and policies can best help market processes work. For money is potentially a "loose joint"'.

Rabin, 2004, 19–20

Chapter 5

The Stability Properties of Monetary Constitutions[94]

> 'Predictability in the purchasing power of the money unit is more important than stability as such. Monetary changes, if fully foreseen and allowed for, leave economic calculation unimpaired and distort neither the distribution of wealth nor the pattern of production and relative prices. If stability has any special virtue, it is merely in providing predictability of the simplest, most understandable, and, if made the rule of policy, most believable kind. . . . the essence of the 'rules' approach is a search for a state of affairs in which prevalent expectations reinforce monetary stability . . . The key idea is perhaps "steadiness" rather than "rules"'.
>
> Leland Yeager 1962, 10, 14

As suggested in the conclusions of part II, the third and final part of this work—which comprises chapters 5 and 6—explores the last institutional and applied topic in this thesis. This final part further elaborates the institutionally oriented themes about money, central banks, and the money supply (as introduced in part II). Moreover, it extends the analysis to monetary institutions and rules other than central banking and compares them. As concluded in the previous chapters, given that central banks are not the necessary and inherently natural institutional evolutionary outcome of banking systems, societies actually do not carry the burden of being institutionally 'trapped' with central banks as the sole institutional solution to banking challenges and informational asymmetries (Paniagua, 2019b).

Accordingly, given that part II has suggested that central banks are not the only institutional possibility for successfully governing banking affairs and providing crucial banking services and regulation, nor are they the sole and natural institutional development of banking dynamics, societies can, and perhaps should, look for more robust monetary alternatives based on comparative institutional analysis. In other words, the historical and theoretical findings of part II suggest not only that institutional diversity and polycentricity are indeed feasible within banking governance, but that this possibility necessarily leads to the intellectual need for analytic mechanisms and frameworks by which we can compare and scrutinize the relative properties of such non-monocentric institutional alternatives. Thus, recognizing polycentricity and institutional diversity in banking entails developing also alternative analytical frameworks by which we can scrutinize and compare the different alternatives (Salter and Tarko, 2018).

Consequently, part III will build upon the previous theoretical insights and historical analysis on central banking and move toward an applied analysis comparing it with more radical and decentralized alternatives such as free banking. Thus part III further explores the specific institutional properties of central banks and the idea of comparative analysis in macroeconomics, applied here specifically to the realm of monetary policy, the stability of expectations, and the money supply. The insights from part II concerning the lack of a robust institutional and economic justification for relying only on central banking to govern banking affairs and maintain stability suggest that the intellectual field of inquiry in macroeconomics is open for further explorations in comparative institutional analysis of central banks and polycentric alternatives. This will be the task of the last two chapters of this work.

The general scope of the following two chapters is to apply institutional analysis and political-economic

[94] A modified version of this chapter was published in the *Journal des Economistes et des Etudes Humaines* as Paniagua (2016a).

robustness considerations in the field of macroeconomics and to apply a comparative institutional analysis to the realm of monetary policy, expectations, and the money supply. Specifically, the following chapters aim to provide as a unified whole an analytical framework of robust political economy applied to banking, a comparative monetary-institutional analysis, and an applied exercise in comparative institutional analysis of different monetary alternatives by using the proposed framework.[95]

The conclusions of part II suggest that a comparative analysis of monetary institutions may be a necessary, albeit deeply disregarded, intellectual endeavor in macroeconomics (see also Salter, 2017a). To conduct such an analysis, however, we need first to define the ideal stability properties and ultimate objectives that monetary institutions must possess or aim at (Myrdal, 1965 [1939]). This is the task of this chapter. The need for confining our scientific analyses within a theoretical framework is acute whenever we conduct comparative analysis (Ostrom, 2010). In other words, if we aim to compare and scrutinize institutions, it is necessary to have a common benchmark that serves as a basis of comparison and to have a normative and theoretical framework to then compare and evaluate them (Demsetz, 1969; Ostrom, 1990, 2005; Paniagua, 2016b; Pennington, 2011, 2016).

Considering these needs for both a normative benchmark and a framework of analysis and comparison, the first task of chapter 5 is to delineate such a framework and benchmark and to define some theoretically desirable expectational properties that monetary institutions should possess so that we can subsequently engage in comparative institutional exercises. The combination of monetary-equilibrium theory, money neutrality, and robust institutional analysis (aligned with constitutional political economy) should contribute important analytical and theoretical pieces to develop a richer framework that provides: the desirable monetary benchmark, the desired normative stability properties of monetary institutions, and the analytical tools to finally engage in non-ideal and applied institutional analysis; throughout which we can realistically compare monetary alternatives and see how they can achieve those previously defined normative and expectational goals.

It is relevant to acknowledge that the 2007–8 Great Recession brought about a higher degree of detrimental monetary-policy unpredictability and expectational volatility (Hetzel, 2009; Sumner, 2012; Taylor, 2009, 2012). Predictable monetary rules or stable monetary constitutions are needed to anchor expectations and to promote nominal stability (Buchanan, 1962; Yeager, 1962).[96] Hence the main purpose of this chapter is to normatively and theoretically define the general expectational and stability properties that monetary constitutions *should* possess in order to function as constitutional coordination devices and thus to generate both an organized system of relations and a beneficial emergent macro complexity from monetary relations as suggested throughout part I.

Hence chapter 5 attempts to define the desirable monetary-policy benchmark and the ideal normative properties that monetary institutions should possess for attaining neutral monetary policy and stability of expectations, both of which are conducive to an organized and orderly system of monetary relations (Horwitz, 2011; Sumner, 2015). Consequently, this chapter borrows from Buchanan's (1962) predictability criterion and from the notion of 'expectational monetary transmission mechanisms' (Romer and Romer, 2013; Sumner, 2012). Chapter 5 proposes that monetary constitutions should be considered 'stable' and 'robust' only insofar as they have institutional properties and dynamics allowing the self-reinforcing and anchoring of expectations (stabilizing expectations) concerning a credible path of monetary-policy neutrality (Horwitz, 2006, 2011).

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[95] Institutional robustness refers here to how well monetary constitutions can deal with informational, epistemic, and incentive problems present in their decision-making structures in order to achieve predictability of monetary policy. See more on political-economy robustness in section 5.3, more particularly subsection 5.3.1. See also the following chapter for a more extended and detailed application of robust political economy to monetary-constitutional analysis.

[96] I use the definition of a monetary constitution found in Schwartz (1987, 391): 'By a constitution I mean established rules, whether or not a written instrument embodies the rules.' The concept is slightly broader than a constitutional rule in the narrow sense of a written explicit one (Brennan and Buchanan, 2000 [1985]). Monetary constitutions are understood in this work broadly as monetary *regimes*, meaning the array of institutions and rules that frame and guide the production of money.

Both the self-reinforcement and the stability of expectations are integral properties of monetary constitutions that allow them to be agents of coordination and therefore stable and institutionally robust (Buchanan, 1962; Romer and Romer, 2013; Sumner, 2013). Constitutional stability and expectational (monetary) predictability mean it is possible to endogenously avoid generating patterns of discoordination and economic crisis due to monetary-policy unpredictability and expectational shocks (Bernanke, 2003; Hetzel, 2009; Romer, 1992; Sumner, 2013; Yeager, 1962).

Thus, institutional comparisons of different monetary arrangements in this chapter entail evaluating their relative capacities to maintain a monetary policy's expectational stability and a monetary policy's stable future *expected* path consistent with the neutrality of money in the process of economic exchange (Horwitz, 2011). In other words, I compare and assess monetary constitutions according to how well they can stabilize expectations concerning monetary policy's future path such that those expectations are consistent also with monetary neutrality at the individual level (Horwitz, 2011; Sumner, 2012).

This chapter helps to illuminate the benefits of understanding money and market coordination from a constitutional and political-economic perspective (Buchanan, 1962, 2010; Horwitz, 2011; Salter, 2014b). By affecting the behavior of nominal magnitudes, relative prices, and expectations, the future expected path of monetary policy largely affects *today's* economic planning, collaboration, and economic calculation (Romer and Romer, 2013; Sumner, 2012). Consequently, monetary policy and monetary institutions—since they affect coordination—can be fruitfully analyzed with the constitutional 'coordinative device' concept and paradigm (Buchanan, 1962, 2010). Accordingly, and building upon this analytical relationship between constitutions and coordination (Ordeshook, 1992), this chapter seeks to define the expectational-stability properties that monetary constitutions should possess in order to become coordination devices or at least avoid being agents of discoordination.

Thus, chapter 5 draws upon the constitutional literature to understand the properties by which monetary frameworks can be considered stable and therefore resilient to endogenous expectational shocks. If constitutions are understood as 'coordinative devices' (Hadfield and Weingast, 2013; Hardin, 1989), then the ultimate coordinative role of monetary policy should actually reside in the institutional properties that monetary constitutions possess to deal with epistemic and incentive problems and thus avoid engendering an unpredictable and unstable future path of monetary policy. Monetary rules and their institutional properties affect and guide the changes in the expected future path of monetary policy, altering deeply current expectations concerning nominal magnitudes, with severe and immediate consequences for coordination, prices, and nominal GDP (Hetzel, 2012; Romer, 1992; Romer and Romer, 2013; Woodford, 2003).[97]

Consequently, this chapter first proposes a notion of monetary constitutions' coordination properties based on the predictability of the future path of the money supply, which anchors expectations at the 'micro level' (i.e., at the agent level) concerning how prices and nominal magnitudes ought to behave (Horwitz, 2011; Sumner, 2012). Monetary policy that changes unpredictably and abruptly (i.e., unanticipated policy changes unrelated to actual changes in real money demand and in velocity) can affect exchanges and *unanchor* expectations, thereby hampering the coordinative properties of the price system and NGDP growth (Hetzel, 2009, 2012; Koppl, 2014; Sumner, 2015).[98] Chapter 5 subsequently suggests

[97] GDP is understood as 'the monetary value of all of the goods and services produced within a nation's borders in a given period of time. GDP can be measured in real or nominal terms. Real GDP is adjusted for inflation. . . . It is intended to measure the actual output of goods and services in the economy in physical terms. NGDP, on the other hand, does not make adjustments for the changing value of the dollar. NGDP gives the value of output in current dollar terms, without adjustments for inflation . . . During a period of inflation, NGDP will rise faster than real GDP because the growth rate of NGDP is the growth rate of real output plus the inflation rate . . . Before the Great Recession, NGDP growth had averaged about 5 percent since 1990, roughly 3 percent real GDP growth and 2 percent inflation' (Sumner and Roberts, 2018, 8).

[98] Reducing uncertainty about monetary policy does *not* suggest that the goal is to avoid any disturbances or change in the supply of money. A neutral money supply should change according to real changes in the demand for money (Selgin, 1988). Those policy changes, however, should be part of a predictable and credible future path of monetary policy consistent with

resilient and general institutional mechanisms and procedures to uphold (self-enforce) such stability and expectational properties and thus systematically avoid both incentive and knowledge problems that could undermine it.[99] Chapter 5 finally contends that monetary policy and rules should be strategic elements that do not systematically hinder economic coordination and expectational stability, and that that capacity largely rests on their *specific* constitutional properties and robust political economy (RPE) comparative robustness (Buchanan, 1962, 2010; Horwitz, 2000; Salter, 2017a).[100]

The chapter proceeds as follows: Section 5.1 reviews the Fed's monetary policy during the 2007–8 Great Recession, including the plausible negative role played by the Fed in causing a boom-bust cycle and monetary expectational instabilities that severely hampered nominal stability and aggregate demand. Section 5.2 explores the general literature on constitutional political economy and its analytical relationship with monetary constitutions and policy rules. Section 5.3 proposes a predictability criterion for monetary policy more consistent with Buchanan's (1964) catallactic system of exchanges than Buchanan's (1962) own stability criterion. Subsection 5.3.1 argues that a robust way to achieve monetary expectational stability and the proposed goals of monetary-policy predictability reside in monetary constitutions' own *self-reinforcing* expectational properties.[101] Section 5.4 foreshadows chapter 6 and briefly undertakes a comparative institutional analysis of alternative monetary constitutions. It succinctly assesses both free banking and NGDP targeting on the basis of the stability properties proposed throughout this chapter. Section 5.5 concludes.

5.1 Monetary Policy at the Center of the Crisis, and the Necessity of Robust Constitutions

The Great Recession had major intellectual repercussions for the economics profession. Since the catastrophic crisis, economists have specifically emphasized the need to analyze a critical institution: the Federal Reserve System. The rationale behind analyzing the Fed's role lies in the systemic nature of the crisis (Beckworth, 2012b; Hetzel, 2009, 2012). Some economists and policymakers have criticized Federal Reserve (monetary) policies from different points of view, which I will address in this section.

Particularly, in this section I briefly review two major critiques: first, the 2005–7 'too loose, for too long' aspect of expansionary monetary policy during the housing boom; and second, the 2008–9 'too little, too late' contractionary and passive policies during the housing bust and banking collapse. Both critiques will be shown to ultimately demonstrate that both the boom and the bust are merely different but complementary sides of a more common (generalizable) and unitary institutional problem: the systematic emergence of monetary disequilibrium and monetary expectational instability, which stem inherently from contextualized constitutional fragilities and lack of institutional robustness of our current monetary regimes (Beckworth, 2012b; Horwitz, 2000).[102]

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the actual changes of money demand (Sumner, 2012, 2013).

[99] The idea of constitutions as 'coordination devices' is drawn from Hardin (1989) and Hayek (1978 [1960]). By establishing a predictable and stable set of rules, constitutional frameworks can be seen as coordinative devices since they allow individuals to accurately formulate plans based on commonly shared procedures, beliefs, and expectations about the behavior of others, and of how rules change and operate (See also Ostrom, 2005). A stable and predictable set of rules enables individuals to share conventions and procedures, which eases cooperation and coordination (Hayek, 1978 [1960]).

[100] The 'positive' role of monetary constitutions for coordination comes from their not being agents that disrupt expectations and economic coordination through monetary disequilibrium and expectational shocks or unanchoring (Horwitz, 2000; Sumner, 2012).

[101] The concept of 'self-reinforcing expectations' comes from Buchanan (1962) (see also Sumner, 1989). These expectations should emerge endogenously as the postconstitutional outcome of the ordinary operations of the system. Self-reinforcing implies that 'if people are sufficiently sure that a particular result is to be achieved, their own private actions will tend to guarantee that their prediction becomes true' (Buchanan, 1962, 170). Self-reinforcing expectations are a form of *endogenous expectations* since they arise from individuals' actions under certain sets of rules, which tend to guarantee that their own expectations will prove correct and therefore stable.

[102] Monetary disequilibrium refers to a detrimental situation in which the total money supply *does not* equalize with economic actors' underlying desire (demand) to hold real money balances. Hence it is the opposite of a 'state of affairs that prevails when there is neither an excess demand for money nor an excess supply of it at the existing level of prices' (Selgin, 1988, 49). I refer broadly to constitutional fragility here as the *opposite* of institutional robustness as defined in footnote 73.

In the postcrisis literature, there have been critiques concerning the Fed's apparently excessively loose monetary policy during the early stages of the Great Recession. Calomiris and Haber (2014) pointed out that lower interest rates and loose monetary policy interacted with lightly regulated financial systems to stimulate imprudent lending, which then channeled excessive credit into the housing sector. This period of high discretion, unpredictability, and loose monetary policy created the special monetary conditions, some economists argued, for lowering interest rates below their natural equilibrium levels (Beckworth, 2012a; Koppl, 2014; Schwartz, 2009; Taylor, 2009, 2012; White, 2012).

This distorted credit environment, some economists argue, also influenced banks and creditors to severely loosen lending conditions (restrictions) in housing, which stimulated an unsustainable boom in the US housing market and related sectors (Beckworth, 2012a, 2012b; Schwartz, 2009; Taylor, 2009). Beckworth (2012a) for example pointed out that the US housing boom was partly induced by highly accommodative monetary policy, which arose because policy makers misunderstood productivity surges (good deflation) during the early 2000s.

On the other hand, some economists have criticized the Fed for erring on the 'too little, too late' side of contractionary and passive policy. Right after the housing bust and at the onset of the financial turmoil (mid-2008), the Fed did not act promptly and strongly in stabilizing nominal income (NGDP), and the velocity of broad money fell while monetary policy was relatively contractionary (Hetzel, 2009). These critics have argued that, regardless of whether the Fed enacted overly loose and expansionary policies during the mid-2000s, these expansionary policies alone cannot account for the Great Recession's length, impact, and severity (Hetzel, 2012).

Analyzing closely the turn of events of mid-2008, some economists maintain that what turned a moderate recession and a contained housing correction in early 2008 into the Great Recession by late 2008 was that the Fed did not act promptly and credibly with a strong and expansionary monetary policy that would have stabilized expectations and nominal spending (NGDP) and its future expected growth path (Sumner, 2012, 2013, 2015). This allowed actual nominal GDP and prices to fall rapidly, depressing aggregate demand and ultimately magnifying the housing correction into a widespread banking and real economic crisis (Sumner, 2012).[103]

According to these critics, it wasn't the unsustainable housing boom that was the crucial element that created the damage, extent, and severity of the Great Recession, but rather a subsequent policy failure by the Fed to act credibly to stabilize market expectations and to stabilize the expected path of nominal income growth (Beckworth, 2012a). Sumner (2012) further argued that sudden deviations in NGDP's expected future path from average historical trends reveal drastic unwarranted changes in monetary policy's expected future path in late 2008. This ultimately had large and rapid dismal effects on financial asset prices and commodities' prices and real production and therefore also reduced aggregate demand.

[103] For evidence on the contractionary-policy failures, see Board of Governors (2009) and Hetzel (2009, 2012). Around June 2008, the FOMC tightened the expected path of future monetary policy by changing the expectations of an *increasing* path of the federal funds rate through its hawkish statements concerning the risk of high inflation during June 2008. From May to June 2008, federal-funds futures increased by fifty basis points despite being in an environment of economic distress (Hetzel, 2009). Furthermore, during the September 16, 2008, Fed meeting, and right after the collapse of Lehman Brothers, 'the Fed decided not to cut rates (from 2.0 percent) because of the risk of higher inflation. Yet, on that very day, the Treasury Inflation-Protected Securities (TIPS) market was forecasting only 1.23 percent inflation over the next five years' (Sumner, 2013, 23). By late 2008, it was obvious to market participants that the Fed had already allowed NGDP growth expectations (its future expected growth path) to plunge and to move erratically; and thus they expected, correctly, that actual NGDP growth for the 2008–9 period would be significantly lower than the Fed preferred. Indeed, actual 'NGDP fell by 4 percent between mid-2008 and mid-2009—the steepest decline since the Great Depression. Asset prices were falling sharply as investors reduced forecasts of future nominal growth' (Sumner, 2013, 13). See also the Philadelphia Fed's 'Survey of Economic Forecasters', which by late 2008 showed a drastic drop in future NGDP growth expectations that reflected markets' negative sentiments and concerns about current policy failures and the new contractionary future stance of monetary policy throughout May–October 2008. As a consequence of all the above, actual NGDP fell about 9 percent below normal trend during 2008–9.

By early 2008, despite the housing bust in some states, markets and investors were originally expecting (forecasting) a future path of monetary policy consistent with stable and sound NGDP growth, as had indeed occurred during most of the Great Moderation period (1985–2007). However, by mid-2008 and in the face of the housing bust and banking distress, the Fed and other central banks mistakenly engaged in passive and (relatively) contractionary monetary policies—such as the Fed's decision in September 2008 not to cut rates—thus allowing inflation expectations and NGDP growth expectations to drift below the Great Moderation norm and trend (Gerlach, et al., 2011; Sumner, 2015; see also footnote 81).[104] This sudden mid-2008 contractionary shift in policy actions created uncertainty about monetary policy's future path, affecting expectations and producing a severe credibility problem for the existent monetary framework. This eventually caused economic discoordination, a fall in aggregate demand, and macroeconomic instability, exacerbating the (up until then) mild 2007–8 housing correction (Sumner, 2012).

In other words, the 2008–9 exacerbation of the crisis can be seen as a set of new, alternative, and negative expectations that suddenly overcame the existent set of market expectations concerning the future behavior of nominal aggregates such as inflation and NGDP. This negative expectational shock and instability created an environment of uncertainty, thereby hampering the coordinative function of the monetary constitution and in turn depressing investment and aggregate demand (Romer and Romer, 2013). This interpretation suggests the necessity of robust monetary constitutions that can credibly maintain the stability of an expected future path of monetary policy (the anchoring of expectations), like the expectational stability properties found on *non*monetary constitutions (Hardin, 1989; Ordeshook, 1992). According to this interpretation, the severe macroeconomic instability of 2008–9 came mostly from the *unanchoring* of expectations and the instability of NGDP's expected future path, which were generated largely by unpredictable and mistakenly contractionary monetary policy (see footnotes 81 and 82 for further empirical evidence).

What matters, then, is to seek institutional monetary arrangements that avoid having monetary policy become unpredictable and unstable and therefore deviate severely away from what markets expect. In other words, what matters is to avoid having a system of monetary policy whose expected future path (or future behavior) unpredictably deviates (unanchors) from current market expectations, which, as the literature has shown, generates severe nominal instability and real discoordination (Bernanke, 2003; Romer, 1992; Romer and Romer, 2013). Thus, as Friedman argued, what matters is not so much whether the money supply and prices are rising or falling, but rather whether they are actually *consistent* with what the public and individuals currently expect (i.e., consistent with market expectations) (Friedman, 1968, 1975; see also Lucas, 1972).

Indeed, contemporary macroeconomic research has suggested that unanticipated and unexpected changes in monetary policy that contravene (or deviate from) its previous expected path can severely affect expectations about nominal magnitudes, directly harming coordination in price setting and debt contracts and ultimately depressing also investments and current aggregate demand (Eggertsson and Woodford, 2003; Romer and Romer, 2013; Woodford, 2003). Hence the aforementioned 2008 contractionary "expectational shock" in monetary policy, at the time of the housing correction, decreased NGDP's expected future path deviating it from trend, which subsequently had a big adverse effect on commodity prices, debt contracts, financial assets, and business confidence, all of which exacerbated the Great Recession and extended it through the rest of the real economy (Beckworth, 2012a; Hetzel, 2012; Sumner, 2015).

[104] There is additional evidence of this expectational shift concerning the future behavior of nominal magnitudes such as future inflation and nominal GDP. Real interest rates, measured by the real yield on five-year constant-maturity TIPS, rose rapidly between July 15 and November 24, 2008, from 0.57 percent to 4.24 percent (FRED Database). Inflation expectations measured as the five-year TIPS spread showed that the market expected rising real rates and falling future inflation deviating from the 2 percent trend. The TIPS spread fell from 2.72 percent on July 3 to 1.50 percent by September 12, and arriving at a critical -2.23 percent by late November (FRED Database).

Moreover, Bernanke (2003) has also been quite emphatic about the crucial role of a credible stance of monetary policy in anchoring expectations about the future path of nominal magnitudes (e.g. inflation/deflation and nominal GDP growth). A credible and clear path of future expansionary monetary policy, Bernanke argues, could potentially insulate the real economy and output from transient exogenous shocks; making those exogenous shocks—such as the 2007 housing correction and the 2008 banking difficulties—to have *merely* short-term and transitory effects upon relative prices and the price level. Thus future predictability in monetary policy, and convincingly anchoring the expectations concerning inflation and of other nominal magnitudes, such as nominal GDP growth—in other words, the *credible anchoring* and stability of expectations concerning overall nominal stability,

> has also reduced the sensitivity of the economy to shocks. One important ['transmission'] mechanism has been the anchoring of inflation expectations. When the public *is confident* that the central bank will maintain low and stable inflation, [exogenous] shocks … tend to have *at most* transitory price-level effects and *do not* result in sustained inflationary [or deflationary] surges. In contrast, when inflation expectations are *poorly anchored* … shocks of these types [real and exogenous] can destabilize [unanchor] inflation expectations, increasing the inflationary [or deflationary] impact and leading to greater volatility in both inflation and output. (Bernanke, 2003, 6, emphasis added)

Consequently, the arguments presented above suggest that by mid-2008, predictability and credibility of the accommodative (and expansionary) expected path of monetary policy would have been enough to stabilize markets' expectations concerning the future growth path of nominal variables at the crucial time when the housing bust materialized. Predictability and credibility in early and mid 2008 concerning the future accommodative stance of monetary policy would have been enough to insulate markets' expectations about the future path of NGDP growth over the next few years from the transient and exogenous shocks to the housing, financial, and banking systems.

Hence it is plausible that the Fed's biggest policy failure during the early stages of the Great Recession was that of being unable to solve the 'technical problem of minimizing instability [and unpredictability] in the [expected] growth path for nominal income' (Sumner, 2013, 27), and thus unable to credibly signal to markets a sufficiently expansionary expected path for monetary policy over the next few years (Hetzel, 2009). In other words, 'in an absolute sense [the stance of monetary] policy was still too contractionary to generate stable growth in nominal spending, which is what really matters' (Sumner, 2015, 233).

The Fed's unnecessarily contractionary (and passive) monetary policy during April–October 2008 signaled to markets a negative departure and change from the expected monetary-policy path (Hetzel, 2009). This contractionary change allowed inflation and nominal-income expectations to drift and to become negative (see footnotes 81 and 82). The mid-2008 contractionary change in the path of policy created also a severe loss of credibility concerning the Fed's actual and feasible commitment to return to the previous normal path of nominal-income growth and inflation. These mistakes in monetary policy could be interpreted as a 'constitutional' or institutional failure of the Fed to fully and credibly commit to a predictable, foreseeable, and enforceable future path of policy. This suggests also the irresolvable *constitutional fragility* of discretionary central banking (Selgin, 2010; Selgin and White, 2005).

Consequently, the 2008–9 Great Recession could be interpreted as a severe policy error and a deep credibility failure on behalf of the Fed in being unable to credibly commit to a sound and expansionary expected monetary-policy path, which would have stabilized the expected growth path of NGDP (and other nominal variables) over the next few years (2009–11) and *insulated it* from a transitory shock in both the financial system and the housing market. Indeed, by mid-2008, the Federal Reserve could have potentially insulated the macroeconomy and the real economy from exogenous and transient shocks, as it did with the 1987 stock market crash (Sumner, 2012). Thus, it could have prevented both financial- and housing-market distress from causing a sudden and sharp decline in nominal magnitudes and

expectations (Bernanke, 2003). Alas, the Fed's 2008 mistakes (or inactions) caused a radical negative shift of both inflation and NGDP expectations, which decreased asset prices, raised real interest rates, and deeply depressed output.

Put differently, both credible and expansionary monetary policy 'might be necessary to offset shocks that would otherwise endanger nominal stability' (Bernanke, 2003, 6). Yet, paradoxically, this is exactly what the Fed did not do and did not communicate to the market convincingly from mid-2008 onward (Hetzel, 2012). Consequently, by late 2008, there was a sudden negative shift in monetary-policy expectations that led many firms and investors to cut back on investment projects and spending. As a consequence of the monetary expectational shift, stock markets, financial assets, and commodity prices severely plummeted, all anticipating (correctly) that the Fed—with its mixed signals and ill-conceived contractionary policies at the time—would have been unable to revive (and stabilize) NGDP growth (Sumner, 2012; see also footnote 81). Hence by late 2008 many firms and markets were forecasting, correctly, the Fed's severe failure to provide a suitably expansionary monetary policy path that would have safeguarded nominal stability in the near future.

Thus a crucial objective for monetary policy going forward, in light of recent research and the evidence of 2008-2009, is to generate a credible and predictable expected future path so that it minimizes the instability of expectations and the unpredictability of, first, the expected growth path of both nominal income and inflation and, second, the expected and potential money-led changes and effects upon disaggregated prices (Lucas, 1972; Yeager, 1962). In other words, wide swings and unwarranted changes in the expected future path of monetary policy are deeply destabilizing, not only for market expectations, but also for current investments, nominal income, and output. Therefore, unstable monetary policy changes and expectational unpredictability (or expectational unanchoring) should be avoided (Romer, 1992; Romer and Romer, 2013).

As I suggested in the introduction of this chapter, if constitutional orders are conceptualized as coordinative and forward-looking devices (see footnote 77), then monetary policy's expected path (which affects present nominal income, output, and prices) can be fruitfully analyzed broadly within the frameworks of monetary constitutions and constitutional political economy (see also Salter, 2014b). As with other types of constitutions, the constitution of monetary policy should be robust enough to safeguard the monetary framework from internal human and political (intended and unintended) failures to uphold the stability of expectations (expectational anchoring) concerning the future policy path and the future behavior of nominal magnitudes such as NGDP growth.

Put differently, monetary institutions should be robust enough to uphold the stability of the public's expectations regarding the future monetary-policy path so that it becomes predictable and credible (Eggertsson and Woodford, 2003). Robustness here implies possessing mechanisms and procedures to uphold a fully credible constitutional order so that it can avoid endogenous forms of monetary unpredictability and unanchoring of expectations through time (Sumner, 2013). Consequently, modern macroeconomic research suggests that unwarranted changes in monetary policy's expected (future) path have far more important and immediate consequences for the real economy and output than previously acknowledged (Eggertsson and Woodford, 2003; Romer and Romer, 2013; Woodford, 2003). This role of policy in anchoring expectations suggests the need for a constitutional attitude and solution in monetary affairs in order to avoid self-generated expectational shocks.

As Buchanan (1962, 2010) argued, monetary constitutions, based on their preconstitutional structures (i.e., overarching rules), procedures, and meta-rules, determine the information, payoffs, and incentives influencing how decision-makers, within those structures, will decide upon monetary-policy matters through time (see also Ostrom, 2005). This section then has implicitly suggested that monetary frameworks and monetary regimes therefore largely determine and guide the changes in, and behavior of, monetary policy through time. Hence monetary rules guide and shape the set of expectations the

public possesses concerning the future path of monetary policy and the associated (expected) behavior of nominal magnitudes such as NGDP growth (Koppl, 2014; Sumner, 2012). This is so since monetary-institutional frameworks and preconstitutional banking structures—similar to any other institutional framework—largely bind and shape monetary policy makers' actions with their rules, information, payoffs, and incentive structures (Buchanan, 1964, 2010; Salter, 2014b, 2017).

This constitutional-political-economic interpretation of monetary policy and the Great Recession extends Eggertsson and Woodford's (2003) and Woodford's (2003) macroeconomic insights by acknowledging that the expected path of monetary policy is largely determined by: the constitutional structure of money, rather than by the specific and ad hoc actions undertaken by specific people (e.g., the meta-rules, incentives, and knowledge/informational structures inherent within specific monetary rules that affect decision-making processes), and also determined by the monetary constitutional structure's specific properties in avoiding credibility problems (Selgin and White, 2005).

As the recent events of the Great Recession suggest, central-banking institutional frameworks do not seem to possess those desired robust stability and expectational properties (Beckworth, 2012a; Hetzel, 2009; see also chapter 6). Therefore, and given the recent track record, central banking can be preliminarily considered (prima facie) an unstable, unenforceable, and thus nonrobust monetary constitution—a *fragile system* (Paniagua, 2016b; Salter, 2014b, 2017; Selgin and White, 2005).

The recent financial crisis also indicates that monetary systems that allow both their nominal and expectational anchors to drift and monetary policy to become unpredictable (or subordinated to discretionary decision-making) have unstable (nonrobust) constitutional properties that make them inherently unenforceable, fragile, and persistently prone to generate expectational unanchoring, precisely because of fallible and arbitrary forms of decision-making (Sumner, 2013). Indeed, as emphasized by Woodford (2003), a significant component to monetary policy is how its future path affects current market expectations. Hence, '[m]onetary policy works not only through the direct effect of open market operations, but also by influencing expectations about the future path of policy' (Hendrickson, 2012, 285).

The main conclusion from the crisis then is that a lack of an enforceable, credible, and robust monetary framework gave a few decision-makers the unconstrained freedom to commit monetary mistakes for the entire society and denied them both accurate information and incentives to quickly correct their mistakes and eventually learn from them. Moreover, the existent framework gave those decision-makers the unconstrained freedom to encourage an unsustainable housing boom, and then allow an unnecessary monetary contraction to develop; thus exacerbating both sides of the economic cycle. All these policy mistakes occurred despite what investors and financial markets were anticipating (forecasting) and conveying to the economy through financial markets and asset prices (Hetzel, 2012; Sumner, 2013; 2015). Hence 'markets react much more strongly to future expected policy than they do to the current stance of policy' (Sumner, 2012, 141; see also Romer and Romer, 2013).

The catastrophic 'boom and bust' events reviewed in this section suggest that both severe monetary disequilibrium and expectational shocks, both of which exacerbated the recession, are in reality inherent and likely outcomes of *postconstitutional* monetary dynamics in which erroneous and unpredictable monetary policy making is allowed to emerge endogenously from the defective meta-rules and the fragile incentive and epistemic structures of some monetary institutions (Buchanan, 2010; Salter, 2014b. 2017). Hence, negative (or positive) patterns of macroeconomic outcomes, such as periods of instability and the manifestation of recessions—analogous to political outcomes (Buchanan, 2008)—are always rule dependent and monetary-constitutionally dependent. This cogently indicates the need for a robust monetary 'constitutional attitude' in macroeconomics and banking (Buchanan, 1962, 2010; Salter, 2017a; Yeager, 1962).

5.2 The Constitutional Political Economy of Monetary Frameworks

Buchanan's constitutional research program, situated within the exchange paradigm, tries to understand the properties of the 'rules of the game' and the mechanisms through which they affect individuals' actions (Buchanan, 1990, 2008). Constitutional political economy (CPE) discusses how the rules work within real settings and how the frameworks, the rules (the preconstitutional order), and their properties guide interactions among fallible individuals at the postconstitutional level. It also discusses the implications of rules for coordination and welfare (Brennan and Buchanan, 2000 [1985]).

In addition, CPE studies how to choose mechanisms and rules that set a framework in which individuals have contextualized information, rewards, and incentives that direct their activities into unintended or deliberate wealth-enhancing activities (Buchanan, 2008). This opens the field of inquiry, including that of monetary policy, to the rational choices that societies can make about selecting constraints and rules that may bind individuals' and policy makers' behavior (Congleton, 2014). Buchanan's work emphasized that 'we must distinguish between pre- and post constitutional levels of analysis. Pre-constitutional analysis opens up the discourse over the rules of the game, while postconstitutional analysis reflects an examination of the strategies players adopt within the defined rules' (Boettke, 1998a, 23). It is precisely the emphasis on the back-and-forth between these levels that economists must put in monetary affairs if we desire to avoid events such as those of 2008–9.

Buchanan's exchange paradigm aims at comparing and designing robust constitutions that allow individuals to seek to exhaust the gains from trade and collaborate (Buchanan, 1964, 1982). Since most economic interactions in the catallactic order are performed through the medium of exchange (see chapter 2), this requires also a profound constitutional understanding of how monetary policy and institutions could affect such social order and postconstitutional interactions. A stable and predictable monetary constitution should thus play a crucial role in Buchanan's (1964) concept of economics as the science of exchange. Consequently, monetary policy falls sensibly within the CPE research project.

In addition, how monetary constitutions affect human interactions and expectations depends on how the postconstitutional dynamics of monetary policy generate deviations away from monetary neutrality and unpredictability of the money supply's future path, which could affect what Buchanan calls 'sophisticated catallactics', or the emergent order (Buchanan, 1964, 1982). As suggested in the previous section, to function most effectively as coordinative devices, the catallactic system of exchanges requires that monetary constitutions should not distort the patterns of relative prices (avoid monetary disequilibrium) and unanchor individuals' expectations concerning how prices and the price level (and other nominal magnitudes) will predictably behave under a future path of the money supply (Friedman, 1994; Horwitz, 2000; Lucas, 1972).[105] In this sense, monetary policy should aim toward being *as neutral and as predictable as possible* in its effects on current exchanges and relative prices. And it should aim also to stabilize the public's expectations concerning the future behavior of nominal magnitudes such as nominal-GDP growth and the price level (Sumner, 2012).

In the previous section, I reviewed how sudden changes to monetary policies' expected (future) path (the policy stance) could severely affect current economic conditions, output, and coordination (Eggertsson and Woodford, 2003; Romer, 1992; Woodford, 2003). Indeed, the Great Recession and the Great Depression are both critical historical evidence of the potential damage done by these monetary and

[105] Monetary neutrality is associated with achieving monetary equilibrium; which is a theoretical-ideal state of affairs in which *actual* individual money balances are exactly equal to economic actors' *desired* real money balances at any given time and at the existent price level. Monetary disequilibrium, in contrast, is the opposite situation in which there are incongruences (disequilibrium) between the actual individual money balances and individuals' desired balances, which brings about monetary and spending adjustments detrimental to market coordination and the formation of relative prices (Horwitz, 2000; Yeager, 1986). The concept of 'neutral money' is employ to designate a state of affairs in which the holding of money balances does not exert an active or distortive influence on portfolio choices, exchanges, prices, and other real variables. For further theoretical details on the concept of 'neutral money' consult Hayek (1967 [1935]), Lutz (1969), and Patinkin (1989).

policy-expectational negative shifts due to sudden unwarranted and contractionary changes in monetary policy's expected path and stance (Friedman, 1975; Friedman and Schwartz, 1982; Hetzel, 2012; Romer and Romer, 2013; Sumner, 2012, 2013).

Modern macroeconomic research suggests that the greatest source of macroeconomic fragility and instability of expectations and output actually comes from the 'expectational channel' reviewed in the previous section (Romer and Romer, 2013). Macroeconomic fragility stems from unpredictability (unanchoring) in expectations concerning monetary policy's stance and expected path; thus it is generated mainly through the public's negative *expectational shifts* (expectational channel) that stem from unwarranted and negative changes (mistakes) in monetary policy making (Eggertsson and Woodford, 2003; Sumner, 2015). Hence postconstitutional dynamics of monetary institutions—meaning the monetary policy stance and its changes enacted under certain sets of monetary and banking rules—can deeply affect market expectations by unanchoring them, in turn depressing also both present output and aggregate demand (Romer, 1992; Romer and Romer, 2013).

Consequently, societies should implement and design monetary constitutions so that their preconstitutional structures and rules are robust enough to, first, provide the correct incentives and bind correctly decision-makers' actions and, second, provide promptly the accurate information required so that postconstitutional dynamics (monetary policy stance) can emerge that generate a credible and stable future path of expected monetary policy (Buchanan, 1962). The analytical focus in macro should then be on comparing and scrutinizing different monetary institutions' incentive and epistemic-informational structures so that we can find those robust enough that they can generate postconstitutional dynamics (monetary policy making) that stabilize expectations of monetary policy in a way that is both *credible* and *consistent with* a predictable future path of the money supply that promotes money neutrality (Horwitz, 2006; Sumner, 2012, 2015; concerning money neutrality see footnote 83).

Hence Buchanan's (1964) concept of the complex network of exchange (or 'catallactics') and its working implicitly depends on a robust monetary constitution that *both* credibly anchors expectations concerning monetary policy and is neutral to the allocative and epistemic signals of the price system and relative prices (Horwitz, 2011; Yeager, 1962). Monetary constitutions that maintain such dual neutrality and stability properties—or in other words, that maintain a stable set of expectations (concerning the predictable behavior of monetary policy) consistent also with a future path and tendency toward monetary equilibrium—could severely improve coordination. They do so also by credibly anchoring individuals' expectations that the future changes and behavior of relative prices, the price vector, nominal-income growth, and the price level will not be distorted through time by unwarranted money imbalances and policy shocks (Hetzel, 2012).

Individuals' capacity to coordinate and sustainably exhaust the gains from trade within a catallactic order depends largely on anchoring their expectation that relative prices and nominal magnitudes will convey relevant information about the real economy, productivity, and relative scarcity (Hetzel, 2012; Lucas, 1972). Individuals then can coordinate their plans, debt contracts, and exchanges by credibly relying on the predictability and accuracy of the price system and also on the predictable future behavior of relevant nominal magnitudes as both precise and prompt epistemic conveyors of underlying decentralized market knowledge and productivity enhancements (Hetzel, 2012).

This dual framework of expectational anchoring and neutral monetary stability fully supports decentralized economic planning, stable expectations, and rational economic calculation (Yeager, 1962, 1986). It does so not only by avoiding detrimental monetary expectational shocks (negative expectational shifts) of the sort that occurred in 2008–9, but also by promoting strong institutional tendencies toward monetary neutrality, which allows the price system to achieve its full epistemic-coordinative role through time (Hetzel, 2012; Horwitz, 2000). As argued, a lack of robust, enforceable, and credible commitment in monetary policy opens the possibility that policy makers can make mistakes and suddenly deviate from

the predictable path of policy, in turn allowing expectations of nominal-income growth, the price level, and prices to become unanchored and volatile. Hence monetary constitutions can be considered stable and robust only if they diminish the postconstitutional appearance of both *monetary and expectational* disruptions to the price system, thus enabling the money-based exchange network to coordinate and allocate resources to their highest-valued uses (Koppl, 2014; Salter, 2014b; Sumner, 2015).

At the postconstitutional level, the stability and neutrality properties aforementioned let actors coordinate and sustainably exhaust the gains from trade by anchoring expectations and by predictably relying on both the future behavior of nominal magnitudes (such as NGDP growth) and the credible maintenance of monetary neutrality throughout the network of exchanges. The constitutional framework briefly outlined here provides us with two elements. First, it provides the dual criteria of predictability and stability (see also Buchanan, 1962) by which monetary rules can be compared. Second, it offers a way to scrutinize the different monetary rules' intrinsic institutional robustness and properties and how they can actually uphold—or move closer toward—the ideal predictability criterion even when political pressure and human fragility are present.

5.3 Buchanan's Monetary-Predictability Criterion Reconsidered

As argued throughout this chapter, a key lesson from the Great Recession is that a crucial property of monetary constitutions is the predictability and stability of the expected path of monetary policy and the expectations it generates for economic actors (Hetzel, 2009). Monetary-policy predictability, Buchanan (1962) argued, is desirable because it improves forward-looking coordination in debt contracts and economic exchanges. Credibly stabilizing the future path and behavior of a nominal variable (such as nominal-income growth) helps to provide a common nominal anchor on which individuals can subsequently coordinate their debt contracts, compare their alternative future plans, and engage in rational price-setting strategies based on common expectations (Hetzel, 2012). Hence, monetary frameworks can work—through stabilizing the nominal 'expectational channel'—as forward-looking coordinative devices (Romer and Romer, 2013).

Coordinating and stabilizing individuals' expectations concerning the future behavior of nominal variables promotes coordination by organizing the future setting of prices and debt and labor contracts in a way that allows economic actors to separate and differentiate fluctuations of the known path of the price level from the normal economic behavior of prices and industries (Hetzel, 2012). Fully credible and enforceable predictability about the behavior of monetary policy makes money a less disturbing element in the workings of the price system and coordination (Sumner, 2013; Yeager, 1962).[106] In what follows, I argue for the need for better, enforceable, and robust institutional structures and constitutional procedures that can generate postconstitutional dynamics that maintain *endogenously* (i.e., self-enforceable) the stability properties (anchoring) of expectations within a fully credible and enforceable system.

In order to pursue this institutional and constitutional approach to macro, I first redefine a meaningful criterion for monetary-policy predictability that enhances market exchanges and coordination. Just because a given monetary-policy outcome or procedure is predictable and stable at the aggregated level, it does not make it necessarily desirable and optimal as a coordinative device and also as a means of enhancing the wealth of economic actors at the microeconomic level (Horwitz, 2011; Wagner, 2012). After all, what Buchanan's (1964, 2010) catallactics seek to achieve is facilitating exchanges and coordination among entities *at the individual level* (Wagner, 2010). Hence, societies should aim for a robust and predictable monetary constitution that is *also* fully compatible with Buchanan's catallactic order at the

[106] If monetary policy is unpredictable and conducted in a way that causes the money supply to fluctuate unpredictably and unrelated to the actual demand for money, the price level and relative prices will behave and move in an unpredictable fashion. This nominal and price-related unpredictability, which stems from volatile monetary policy disassociated from the demand for money, damages the ability of the price system to work as numeraire, undermining its epistemic role in price setting, economic rationality, and economic coordination (Horwitz, 2000; Yeager, 1986).

individual level (Horwitz, 2011).

Buchanan (1962, 2010) for example, advocated an explicit and binding constitutionalization of money in order to achieve predictability and stability in the value of money since it would remove uncertainty about the future behavior of the general price level. Stability and predictability of the price level could, Buchanan argued, lead to 'greater economic efficiency', since money can thereafter act as a stable and predictable measure of value, something useful for intertemporal assessment of comparative economic value and plans (Buchanan, 1962). This ultimately enables economic evaluations and rational comparisons based on the stability of money's purchasing power. Buchanan, however, much like Wicksell (1967 [1906]) and other accomplished economists, disregarded the logical and economic incompatibility between a stable and constant price level and actual monetary neutrality (Myrdal, 1965 [1939]; Selgin, 1990).[107]

As hinted in the previous sections, general stability (anchoring) of expectations is important, but overall expectational stability must be consistent and compatible with a credible monetary framework that also promotes tendencies toward money neutrality at the micro level (Horwitz, 2011; see also footnote 85). This combination of two goals has implications when evaluating and comparing monetary constitutions such as NGDP-futures targeting (see section 5.4). Monetary frameworks should provide a stable and predictable expectational setting in which actors can trade in and fully rely on prices (or the price vector) as accurate epistemic market signals (Horwitz, 2011; Lucas, 1972). In such an environment, they can predict and expect—with credibility—that future money-supply changes will not drastically distort prices and depress nominal magnitudes and hence will not distort their transactions, contracts, and economic plans through time (Brennan and Buchanan, 1981; Sumner, 2012).

As Buchanan (1962, 2010) argued convincingly, a common predictability criterion allows us then to compare how alternative monetary institutions might seek to achieve or move toward such a stability goal. Nevertheless, unlike Buchanan (1962) and considering the lessons learned from the Great Recession, I argue that a superior criterion is for monetary policy to seek *both* to minimize nominal distortions and expectational shocks (expectational unanchoring) (Sumner, 2012) and also to become as neutral as possible with respect to relative prices at the micro level (Horwitz, 2000). This dual monetary-expectational objective allows agents to avoid expectational instabilities and shocks concerning how nominal aggregates *and* prices ought to behave under a neutral-money environment.[108]

The market's competitive solution and its allocative efficiency depend on money prices accurately communicating underlying real economic fundamentals (Horwitz, 2000; Rabin, 2004), which require that monetary institutions not introduce endogenous nominal and expectational distortions (Lucas, 1972). How efficiently and sustainably the network of exchanges develops depends on the price system's predictability and capacity to work properly under monetary neutrality rather than under a general and 'crude' (superficial) form of stability of the price level (Horwitz, 2011; Lutz, 1969).

In other words, anchoring expectations at the micro level should focus also on stabilizing the price system's future behavior, predictability, and working properties consistent with money neutrality in order

[107] The incompatibility between a stable price level and money neutrality (under productivity enhancements) was pointed out both by Hayek (1999 [1925]) and Myrdal (1965 [1939]). They argued that stabilizing (keeping constant) the price level in the face of a productive and growing economy (i.e., productivity enhancements) implies also superficially stabilizing an aggregated 'macro' nominal magnitude *at the cost* of potentially distorting interest rates and prices through unwarranted monetary injections. On how the price level ought to behave under productivity enhancements and economic growth see Beckworth (2012a) and Selgin (1997, 1999).

[108] Here I assume a system that seeks to promote money neutrality *as if* following a 'productivity norm' (Selgin, 1990, 1997). Importantly, the implicit expectational properties in an environment that promotes such monetary neutrality (or productivity norm) refer to, first, the stability of expectations that prices will always have a *downward tendency* in the face of specific (sector-oriented) growing productivities and, second, the expectation that the general price level will accurately vary and most likely fall in order to reflect permanent changes in the costs of production and productivity. Finally, the third property implicitly assumed is that expectations of nominal income will predictably vary, behave, and grow at a rate equal—or closely related—to the growth rate of real factor inputs (Selgin, 1990, 1997).

to allow micro-level coordination and individuals' expectational stability concerning the benign future role of prices and nominal magnitudes as accurate and relevant market conveyors and epistemic signals. Under those micro stability conditions, firms and individuals can credibly rely on intertemporal and future prices and nominal variables to smoothly coordinate plans, contracts, and timely adjust their economic actions (Hayek, 1999 [1928]; Horwitz, 2000, 2006).

On the other hand, if the aggregated price level is stabilized or kept constant, this will *not* necessarily minimize monetary-induced micro-level and price changes and distortions, especially when the economy experiences gains in productivity, since the price level tends to actually fall at such times to reflect falling prices and productivity gains (Hayek, 1999 [1925]; Selgin, 1997). Allowing monetary and microeconomic distortions necessary to keep the price level stable (constant) and predictable indeed stabilizes expectations concerning the future behavior of the general price level. But this comes *at the expense of* not allowing different sets of local prices and the price level to actually reflect underlying and heterogeneous changes in *industry-specific* productivity and economic growth; thereby producing also local distortions and detrimental unpredictability within the real network of exchanges at the microeconomic level (Beckworth, 2012a; Horwitz, 2011; Selgin, 1997).

The above kind of aggregated policy also increases epistemic and signal-extraction costs for economic actors—that is, the cost to disentangle real productivity effects from monetary-distortive effects (Hetzel, 2012; Lucas, 1972). In other words,

> achieving near-term price stability might sometimes not be sufficient to avoid serious macroeconomic downturns in the medium term. Moreover, recognising that all deflations are not alike, the active use of monetary policy to avoid the threat of deflation could even have longer term costs that might be higher than the presumed benefits. The core of the problem is that persistently easy monetary conditions [in the face of price stability] can lead to the cumulative build-up over time of significant deviations from historical norms. (W. White, 2006, 1)

Hence, recent 'boom and bust' cycles and negative experiences associated with stabilizing the price level (Beckworth, 2012a; Schwartz, 2009; W. White, 2006) suggest that not all macroeconomic aggregated nominal stability and stability of expectations are consistent also with expectations of money neutrality at the individual level (Horwitz, 2011). Stability of expectations concerning the future path and behavior of the general price level (e.g. a constant zero-growth path) might still be *unable* to underpin and safeguard microeconomic stability, money neutrality, and predictability of the future behavior of disaggregated and local prices that are concomitant with money neutrality at the individual level (Hayek, 1999 [1925]; W. White, 2006; see also footnote 85).

Consequently, 'macro expectational' stability (e.g. stability of expectations concerning the future behavior of the general price level) might *not* necessarily be conducive to either monetary neutrality or microeconomic and disaggregated price predictability that should actually reflect sector-specific productivity surges, real economic data, and local knowledge (Horwitz, 2011; Selgin, 1997, 1999).[109] Put

[109] For instance, Horwitz (2011) argues that the predictability of the general price level is a crude form of macro predictability since, although predictable and stable in the aggregate, it might still hide microeconomic uncertainty and it does not minimize monetary disequilibrium. In cases of growing economies, productivity causes prices of final goods to fall; instead, stability of the general price level requires unnecessary monetary injections, causing micro unpredictability and price distortions to sustain it (see also W. White, 2006). This creates microeconomic uncertainty about how monetary policy will in fact affect the behavior of different relative prices in specific sectors of the economy that are becoming more productive, affecting also efficient resource allocation and perhaps even exacerbating unsustainable booms (Beckworth, 2012a). Crude macro predictability and aggregated expectational stability, in the form of price-level stability, could then come at the cost of both undermining micro predictability of certain prices and bringing also monetary *non*-neutrality and distortions into individual markets. Hence it is not true that the fact that the general price level (or other macroeconomic nominal magnitude) is predictable makes it necessarily desirable for money to still remain neutral to relative prices and the allocative processes of the catallactic order

differently, '[t]he behavior of the price level is therefore not of primary importance and might be misleading with regards to the [disaggregated] effects of monetary policy' (Hendrickson, 2012, 271). Or in the words of Horwitz:

> Although a stable overall price level enhances predictability at the macro level, achieving that goal in a growing economy requires disruptions in some number of the millions of prices that comprise that price level. Those disruptions cause the sorts of problems discussed earlier and reduce predictability at the microeconomic level. Price level stability can only achieve a 'crude' notion of predictability based on the analytical aggregate construct of the price level, while reducing predictability in the individual [and local] markets that comprise it. (Horwitz, 2011, 337)

Alternatively, to be actually consistent with money neutrality, monetary constitutions that aim instead at anchoring the public's expectations concerning the future path of the money supply in a manner consistent with money demand have the very advantageous characteristic discussed above over arrangements that instead anchor expectations about the future value (or behavior, or growth rate) of aggregated nominal magnitudes such as NGDP growth (see also footnote 87). The advantage lies in the fact that under this alternative, the price level and other nominal (aggregated) magnitudes can still remain *predictably flexible*—and thus behave predictably in the future—even in the eventuality of aggregate supply shocks and productivity enhancements (Selgin, 1997).

Thus, under this sort of predictable future monetary policy consistent with money neutrality, the price level will be expected to rise in the event of a negative supply shock and expected to fall, persistently, if overall economic productivity surges. This alternative 'policy goal' or form of predictability of the future path of the money supply, one in which the future money supply is consistent with changes in demand, is 'epistemologically superior', as precise (non-distortive) market signals and nominal magnitudes can accurately behave and reflect underlying productivity enhancements and scarcity conditions (Selgin, 1997, 22–23; Horwitz, 2011).

5.3.1 Self-reinforcing and endogenous expectations as robustness

Given the above suggestion for a predictable monetary policy, I now focus in this subsection on determining the institutional means or mechanisms of how to maintain the aforementioned stability properties. In order to achieve predictability, monetary constitutions should seek consistent and credible rules (Simons, 1936; Sutter, 1997). Participants in the postconstitutional monetary game should form expectations in a way that is consistent with the framework's systematic behavior and also its *expected* behavior given its institutional constraints (Sumner, 2012).

If the monetary framework's operation is analyzed along with real human limitations and political-economy considerations, then we see that its procedures and systematic behavior (policy outcomes) depend on possibly fallible decision-makers prone to misaligned incentives (self-interest), political pressures, and epistemic limitations (Pennington, 2011; Stigler, 1971). Hence, given this imperfect reality of institutional arrangements, how can the appropriate predictability and expectational criterion aforementioned be fully upheld in practice? This is the question I seek to address in this subsection.

It has been acknowledged by some economists that monetary arrangements that transfer the responsibility of policy and action to a few public authorities or bureaucratic decision-makers who are immune to legal and reputational penalties are prone to generate instability and credibility crises (Friedman, 1994; Hetzel, 1985; Kydland and Prescott, 1977; Selgin and White, 2005; Simons, 1936). Hence, the suggested stability properties of expectations should be analyzed along with political-economic and institutional considerations. In particular, robust political economy (RPE) allows us to

(Horwitz, 2011).

evaluate and compare different institutional arrangements and their properties under *more realistic* assumptions concerning human (epistemic-informational) capabilities and potential misalignment of incentives (Pennington, 2011). Institutional robustness here refers to 'a political economic arrangement's ability to produce social welfare-enhancing outcomes [such as maintaining stability of expectations] in the face of deviations from ideal assumptions about individuals' motivations and information' (Leeson and Subrick, 2006, 107; see also preface and chapter 6 of this work).[110]

The degree to which institutional frameworks can be considered robust or fragile depends, first, on whether they possess institutional tendencies and rules to consistently move monetary policy toward the dual-ideal benchmark of neutral money predictability and expectational stability. Second, monetary robustness depends on how the different institutional tendencies toward expectational stability, predictability, and money neutrality can still emerge, and be upheld, *given* worst-case-scenario assumptions concerning decision-makers' motivations (self-interest), political pressure, and information asymmetries or bounded rationality (Salter, 2014b). Thus, fragile (nonrobust) institutions are ones that are unable to promote and maintain the dual monetary objectives whenever imperfect knowledge (lack of omniscience), political pressure, and lack of benevolence are ubiquitous.

Under reasonable and realistic assumptions of imperfect human endowments (less-than-perfect information and misaligned incentives), the sensible institutional analysis should focus on understanding how monetary constitutions can still achieve both stability of expectations and monetary neutrality even in that imperfect human reality and context. Building from these political-economic considerations, Buchanan (1962) suggested that to robustly maintain the predictability of a stable price level, institutions should aim to uphold it *endogenously* through the normal functioning of the system. In other words, they should aim to maintain monetary policy's predictability by relying on *postconstitutional* dynamics in the form of endogenous expectational anchoring as an attempt to sidestep inherent informational and incentive problems of decision-makers (Buchanan, 1962, 163–165).[111]

This endogenous and self-enforcing form of predictability is consistent with Buchanan's suggestion of 'self-reinforcing expectations' (Buchanan, 1962) as a way to sidestep human frailty, lack of knowledge, and credibility and incentive problems (see also footnote 79). Thus, expectational anchoring and stability should emerge as the postconstitutional outcome of the ordinary and normal operations of the system. Self-reinforcing of expectations implies that 'if people are sufficiently sure that a particular result is to be achieved, their own private actions will tend to guarantee that their prediction becomes true' (Buchanan, 1962, 170). Put differently:

> The primary virtue of any 'automatic' or commodity standard of money lies in the fact that only in such a system would the forces of the competitive market be directly utilized to achieve monetary predictability. . . . [in such system] The profit-seeking actions of speculators [at the postconstitutional level] will tend to ensure that the predictability implicit in the rule-as-directive to the monetary authorities will, in fact, characterize the rule-as-result. The phenomena here have been referred to as self-reinforcing expectations. (Buchanan, 1962, 169-170; see also Sumner, 1989, 2013)

The endogenous formation and self-reinforcing aspect of expectations that arises from the normal and

[110] Institutional robustness relates to monetary constitutions' capacities to promote wealth-enhancing goals, and to uphold the neutral monetary and predictability criterion throughout the system's normal functioning, even with severe deviations from ideal epistemic (omniscience) and incentive (benevolence) assumptions. Robust monetary constitutions are the ones that can generate tendencies to uphold the expectational stability and money neutrality properties and that can maintain those policy tendencies, despite both imperfect benevolence (some degree of self-interest) and imperfect information (less than omniscience) on behalf of the decision-makers involved in the system. See more details in chapter 6.

[111] Buchanan (1962) established that the normative stability and monetary criterion could most effectively (robustly) be achieved through self-enforceable conventions and procedures allowing predictability to emerge through the 'normal ordinary operations of private decision-making at the post-constitutional level' (Buchanan, 1962, 164).

decentralized decisions of actors (and exchanges) not only could avoid epistemic, informational, and public choice problems, but it would also be consistent with the required properties of 'stable constitutions' when seen as coordinative devices (Hardin, 1989). This requires that constitutions should avoid seeking top-down (exogenous) forms of enforcement and stabilization properties and instead establish endogenous conventions and procedures so that stability of expectations arises from, and is maintained by, the self-reinforcing expectations about people's actions at the postconstitutional level (Ordeshook, 1992).

The suggested endogenous self-reinforcement of expectations eliminates the risk reviewed in the previous sections of having an external (top-down) decision-maker, such as the Board of Governors of the Fed, which allows for unwarranted expectational shocks due to mistakes, lack of knowledge, incentive misalignments, or political pressure. Robust constitutional properties of self-reinforcing expectations—as the ones suggested by Buchanan's quote above—bolster rather than undermine the monetary policy's expected future path, in turn reinforcing macroeconomic stability (Sumner, 2012, 2015).

Under self-reinforcing expectations, the postconstitutional interactions of decision-makers should define or reinforce the monetary policy's guidelines: decision-makers act in such a way that their postconstitutional interactions and expectations *reinforce* the expected policy path rather than undermine it. The existence of self-reinforcing and endogenous expectations insulates the real economy from endogenous and systemic monetary expectational shocks (Sumner, 2013). In contrast, systems that try to stabilize and anchor expectations from the outside (the top-down approach) actually dissociate policy making from the emergence of expectations. They are also nonrobust, extremely fragile, and inherently subject to RPE problems, public choice and epistemic considerations, and human-fallibility challenges whenever decision-makers are not omniscient or benevolent, as in the case of the Great Recession reviewed previously (Sumner, 2013, 2015).

Full credibility is fundamental in guiding and anchoring market expectations, but as Buchanan (1962) and Sumner (2012) pointed out, the only robust and realistic way to maintain credibility and to fully solve the problem of expectational anchoring—and thus to avoid public choice and epistemic problems—is through *sidestepping it entirely*, meaning stabilizing expectations through their own endogenous formation and self-reinforcement (Sumner, 2013). The stability of self-reinforcing expectations seems to be far more fundamental for monetary robustness than previously acknowledged (Selgin and White, 2005; Yeager, 1962).

Additionally, self-reinforcing and endogenous expectations concerning the future path of the money supply consistent with money neutrality (or a credible monetary-policy path that seeks to minimize monetary disequilibria) can also provide a common set of expectations concerning how prices will behave and change given that credible path of the money supply. Put differently, monetary predictability can create the endogenous stability of expectations concerning how prices and nominal magnitudes will behave under a framework that promotes strong tendencies toward money neutrality. This also avoids trying to stabilize expectations concerning other nominal variables, such as the general price level (or other nominal aggregates), whose numeric stability might prove inconsistent with monetary neutrality at the individual level (Horwitz, 2011; see also footnotes 85 and 87).[112]

The above means that when expectations are credibly anchored in a monetary environment that promotes strong tendencies toward money neutrality, individuals also credibly expect that nominal variables and

[112] The actual expected future path of nominal variables in a system that seeks monetary equilibrium will depend specifically on which monetary standard the economy is operating under. For simplicity, I consider the expected path of nominal variables as if under a free banking arrangement or a 'productivity norm' rule in a small, open economy under a commodity standard growing faster than the rest of the world. Aiming at maintaining monetary equilibrium through, for example, free banking under such circumstances, implies (as an unintended outcome) a growth path of nominal income equal to real factor growth (Selgin, 1997, 64).

magnitudes—such as local prices, the general price level, and nominal-income growth—will behave in an associated predictable way (predictably flexible) so that they will accurately reflect and convey underlying economic knowledge and transmit market signals such as real factor inputs' growth and productivity enhancements in certain specific industries (Horwitz, 2011; Selgin, 1997, 22–23).

5.4 A Preliminary Comparative Institutional Analysis of Monetary Alternatives

Monetary frameworks should recognize the aforementioned constitutional stability challenges (Foley, 1990). They should promote postconstitutional dynamics that ensure predictable monetary policy and self-reinforcing expectations. Given the stability properties proposed earlier, I now briefly conduct a comparative institutional examination. I succinctly analyze how free banking and NGDP targeting might possess the suggested expectational and neutrality properties to see whether they can be considered stable and robust constitutions.[113] Chapter 6 will delve much deeper into a comparative institutional analysis of monetary alternatives, including central banking and free banking. Regarding a market-based form of NGDP-futures targeting as proposed by Sumner (1989, 2012, 2013), it is not altogether clear whether the expectational nominal anchoring of this system really anchors expectations concerning the future behavior of nominal magnitudes in a manner consistent with monetary neutrality at the micro level (see also footnotes 85 and 87).

Buchanan's (1962) suggestion of self-reinforcing expectations around a defined and stable future path of the price level (a stable zero-growth path), or Sumner's (2012, 2013) suggestion of anchoring the expectations of NGDP growth (a stable 5 percent NGDP growth) are both forms of top-down, exogenously provided numeric solutions. Nevertheless, these proposals—after they exogenously define the numeric values of the nominal magnitudes and externally establish the numeric goals of policy—do subsequently, and endogenously, self-reinforce and anchor expectations of the public around those previously defined variables. These self-reinforced expectations about nominal magnitudes are, however, originally defined ex ante and imposed exogenously by a monetary authority.

The above means that the definition, stable numeric value, and specific future behavior of those nominal magnitudes, that these two proposals seek to stabilize, are defined and established *exogenously* and *arbitrarily* by an authority ex ante. Consequently, the aggregated and nominal magnitudes are here numerically defined and fixed prior to and outside the postconstitutional system in which individuals actually exchange. Put differently, the stable future path of the price level, or of NGDP growth, is in these two proposals defined regardless of what the process of exchange would have actually produced (Wagner, 2012).

Accordingly, the nominal magnitudes' prearranged future behavior and numeric values are here paradoxically defined before the actual process of exchange produces the emergent real value and behavior of those very same nominal magnitudes. Thus NGDP targeting stabilizes (anchors) expectations of a nominal magnitude (nominal-GDP growth), but this stable set of expectations is entirely defined and imposed *preconstitutionally*, meaning established exogenously, arbitrarily, and ex ante by an authority. Paradoxically, the expectations are defined also before the process of exchange unfolds and actually produces the emergent underlying value of NGDP growth that would have been consistent with the system's normal postconstitutional workings.

These ex ante and exogenously defined stability properties are different in nature and in outcome from what the postconstitutional and catallactic order will actually produce. Hence how NGDP is actually obtained and stabilized matters for monetary policy and macroeconomic stability (Salter, 2013). Therefore they are disassociated from the actual expectations that would have emerged

[113] I analyze briefly here only these two systems since they do not rely on top-down exogenous forms of expectational anchoring and instead use postconstitutional dynamics to uphold their policy objectives and to self-reinforce the expectational anchoring and goals of policy. See also Salter (2014b).

postconstitutionally from the normal process of exchange. In simple terms, how do we know, ex ante, that the exogenously defined value of a stable NGDP growth, based on which we will anchor expectations under NGDP targeting, is at all times consistent with and equal to an ex post form of NGDP growth that would have emerged from a system that actually upholds money neutrality from the bottom-up? Consequently,

> NGDP as an emergent result of the market process is not the same thing as NGDP that is an object of choice for a central bank. In other words, fractional-reserve free banking and NGDP targeting by the central bank are not two different 'technologies' for achieving the same theoretical end. . . . The classic insights on knowledge, the pricing process, and the institutional framework for economic activity show that process matters; this is no less true for NGDP. (Salter, 2013, 49)

Hence it seems that these arbitrarily defined, exogenous, and a priori established macro-level expectations—under NGDP targeting—are not homologous in nature, value, and process to the postconstitutional emergence of expectations concerning the path of a flexible price level and NGDP growth consistent with a monetary policy seeking to uphold money neutrality. Thus it is not altogether clear that the crude and macro stability of expectations that NGDP targeting provides are consistent with the stability of expectations that would have arisen postconstitutionally in a system that truly maintains money neutrality and monetary equilibrium at the microeconomic level (Salter, 2013). In other words, the institutional process throughout which the stability of expectations concerning nominal magnitudes is attained matters greatly for macroeconomic stability and money neutrality (Horwitz, 2011).

Instead, under a system that seeks to maintain money neutrality (monetary equilibrium) at the microeconomic level, a stable and predictable future path of NGDP growth will likely emerge, but unintendedly and postconstitutionally *from the process of exchange* (Selgin, 1988; see also footnote 90). Moreover, this ex post emergent form of stable and predictable NGDP growth—consistent with money neutrality at the micro level—might not be equal, at all times, to the one that would be arbitrarily defined ex ante and exogenously by the monetary authorities seeking to stabilize NGDP expectations under NGDP targeting (Salter, 2013). This is the reason why NGDP targeting disassociates or separates the stability of expectations concerning an arbitrarily defined value or growth of a nominal magnitude from the actual process of monetary exchange that should have generated both the expectations and the value of those nominal magnitudes in the first place.

Indeed, this top-down and arbitrary aspect of NGDP targeting led Selgin (2013) to describe NGDP targeting as 'a form of economic planning', with all the informational limitations and knowledge problems that such a form of ex ante and monocentric form planning actually carries (Hayek, 1948 [1937], 1948 [1945], 1973).[114] Therefore, '[t]he consequence of this divergent approach to NGDP is that NGDP becomes a different phenomenon. Patterns of economic activity can differ between the two systems even should they equally well stabilize NGDP' (Salter, 2013, 47).

Free banking, by contrast, indirectly stabilizes expectations of a future growth path of nominal GDP and stabilizes expectations of how disaggregated prices will behave under productivity surges *after* the process of exchange actually unfolds (Salter, 2013; Selgin, 1997; see chapter 6). In other words, by promptly (automatically) and credibly correcting monetary disequilibria at the micro level when they arise, free banking promotes both strong monetary tendencies toward neutrality and a decentralized, yet predictable,

[114] Or as Schuler stated, 'With nominal GDP targeting it may well also happen that there will be flaws that only become apparent through experience. My reason for thinking that flaws are likely is that, like inflation targeting, nominal GDP targeting is an [exogenously] imposed monetary arrangement. It is not a fully competitive one. . . . Nominal GDP targeting when carried out by a central bank, which has monopoly powers, is a form of central economic planning subject to the same criticism that apply to all forms of central planning. In particular, it does not allow for the occurrence of the type of discovery of knowledge that comes from being able to replace one arrangement with another through competition' (Schuler, 2013).

form of the future path of monetary policy consistent with money neutrality (Selgin, 1988). Hence this self-enforceable system subsequently—and unintendedly—anchors expectations about how nominal magnitudes and prices will behave (predictably flexible) through time in a manner consistent with such credible tendencies toward money neutrality at the microeconomic level (Horwitz, 2000, 2011; Selgin, 1997).

This self-enforcing and credible decentralized process of a neutral-monetary-policy path allows also the ex post and postconstitutional emergence of a common and stable set of expectations concerning how both disaggregated prices and NGDP growth will predictably behave and change given this credible and robust constitutional background of how the money supply will constantly adjust to correct individuals' money imbalances. Free banking, thus, by having strong tendencies toward maintaining monetary neutrality through time, unintendedly obtains also macro-level expectational stability of nominal aggregates (Horwitz, 2011; Salter, 2013). But their stable growth, behavior, and actual nominal values are determined ex post and as a postconstitutional *by-product* of the workings of the system that seeks firstly and foremost to maintain monetary equilibrium at the micro level.

Accordingly,

> A free banking system . . . will minimize money-induced movements in the price level, it will allow for the price level to change in response to changes in total factor productivity. More specifically, the price level will move inversely to changes in productivity . . . If prices are supposed to reflect underlying scarcities, then allowing them to move in response to changes in productivity would seem to be the appropriate policy. . . . Rather than attempting to keep the price level [or NGDP growth] constant and therefore predictable, the so-called 'productivity norm' [or a form of free banking] argues that the predictability of the relative prices *being indicators of relative scarcity* is a more important form of predictability. (Horwitz, 2011, 336-337, emphasis added)

In contrast, NGDP targeting prioritizes a top-down and ad hoc form of macro-level (or crude) stability of nominal-GDP growth, established arbitrarily prior to and outside of the normal workings of the economic system. This might ultimately be revealed as inconsistent with money neutrality at the microeconomic level. Indeed, just as Hayek (1999 [1925]) emphasized the negative role of the money supply in potentially altering the structure of production and relative prices under a general price-level-stabilization targeting (see W. White, 2006), we should be equally cautious about attempting to stabilize expectations concerning the growth path of nominal aggregates defined arbitrarily ex ante and outside of the postconstitutional dynamics that generally produce their actual value. This caveat holds especially true when the expectational macro targets and the overall nominal stabilization goals are simply decided by an authority *a priori* rather than stemming from a self-reinforcing process that emerges postconstitutionally from exchanges.

Put differently, even if both—free banking and NGDP targeting—eventually reach a similar nominal macro outcome in regards to stabilizing nominal spending growth, this result *does not* mean that achieving the same macro end throughout different monetary processes is irrelevant and equally neutral. Indeed, obtaining such a macro outcome through top-down pre-constitutional means would likely have entirely different effect upon the coordination process of the economy if it had been achieved instead through bottom-up postconstitutional means. The fact that there is an unintendedly predictable NGDP future behavior and its stable growth under free banking (Selgin, 1990, 1994), does not mean that any plausible way to achieve such NGDP goal will be equally stable and neutral to the economy and coordination. Stable and predictable NGDP growth *as an emergent outcome* and stable NGDP growth *as an ex ante and bureaucratically defined object of choice* can have the same value, but entirely different monetary effects upon coordination and the sustainable allocation of resources (Salter, 2013).

The stability properties outlined in the previous sections suggest that stabilizing expectations of statistically constructed macro aggregates *should not be of primary importance* to promote coordination and money neutrality in a catallactic order—although we have also seen that they could nonetheless improve coordination and stability (Horwitz, 2011). As it has been suggested earlier, the objective is not to match and stabilize expectations in general, but rather to stabilize the correct kind of expectations that are consistent with money neutrality. But how can we be sure that the central bank has decided correctly on which macro-level expectations to match and stabilize?

A monopolist supplier of money can certainly stabilize (anchor) any expectations concerning NGDP growth (Sumner, 2013), but that doesn't mean either that those arbitrarely-defined expectational anchors are correct and consistent with money neutrality, or that expectations concerning nominal magnitudes are actually homogenous throughout the economy. Consequently, the policy objective is not only about anchoring expectations about the future path of NGDP, but also, and perhaps most importantly, about choosing and stabilizing the *correct* future path of NGDP growth *consistent with* money neutrality at the microeconomic level. These concrete features and matter of policy choices—related with implementing NGDP targeting—pose severe practical and epistemological challenges to central banking not actually present in free banking (Salter, 2013; Selgin, 1990, 1994, 2013).

Hence the focus instead should be on anchoring individuals' expectations concerning how relative prices and nominal-income growth will predictably behave (be predictably flexible) in a context of a credible path of the money supply that diminishes monetary disequilibrium at the micro level. As argued throughout this chapter (see footnotes 85 and 87), macro-level expectational stability does not necessarily translate into beneficial microeconomic-level stability and predictability (Horwitz, 2011). Arbitrarily defining stable but crude macro-level expectations of nominal income growth (decided ex ante by an external authority) does not ensure micro-level stability of expectations concerning how the future path of the money supply will affect different markets and disaggregated and local prices in the face of heterogeneous and unanticipated changes in productivity (Cachanosky, 2015; Wagner, 2010).

Consequently, NGDP targeting promotes a macro-level form of stability decided entirely outside the postconstitutional market order, and thus it disregards individuals' micro-level expectations concerning disaggregated prices and their local market conditions. This ultimately anchors individuals' expectations concerning a macro variable or aggregated statistic but potentially destabilizes and unanchors individuals' relevant expectations of how disaggregated prices and local market conditions will actually behave in such an environment of (an arbitrarily defined) stable nominal-income growth. Stabilizing aggregated or macro-level expectations *ex ante* and by fiat might actually be a misleading indicator of microeconomic predictability and coordination (W. White, 2006). It thus potentially becomes an uninformative, and perhaps even a harmful, macro-indicator of real underlying stability and predictability concerning long-term distortive effects of monetary policy on markets and the structure of production.

Hence one would expect NGDP targeting to anchor expectations concerning a nominal magnitude, and this macro expectational stability will indeed insulate the economy from major and negative expectational shifts and monetary shocks similar to those that exacerbated the Great Recession (Sumner, 2015). Nevertheless, this crude ex ante form of 'aggregated stability' could *still* generate and conceal local monetary disequilibrium, sector-level imbalances, and local market distortions. It would thus potentially generate also microeconomic and price unpredictability, discoordination, and a general unsustainable misallocation of resources similar to the one that occurred in the US housing sector (Beckworth, 2012a; Cachanosky, 2015). NGDP targeting could, most certainly, avoid the exacerbation and unfolding of the next Great Recession, but it might still generate new forms and shapes of money-induced unsustainable booms, similar in nature to the 2003-2007 unsustainable and undesirable US real estate bubble, with all the unsustainability, misallocation of resources, and distortions that it entailed.

To conclude, NGDP targeting does stabilize (anchor) market expectations through a futures-market

trading process that is indeed self-reinforcing and endogenous (Sumner, 2012, 2013). Accordingly, it does move very close to the ideal self-reinforcing expectational-stability properties suggested in section 5.3. This robustness and stability of expectations, which is indeed self-reinforced and sustained by the postconstitutional dynamics of a futures-market trading process, makes this proposal far superior to standard or traditional central banking policies (Cachanosky, 2015; Salter, 2014b, 2017; Schuler, 2013).

However, NGDP targeting also promotes a top-down, crude form of expectational anchoring, treating the stability of nominal-income growth as the arbitrarily imposed and *explicit goal* of policy and choice, rather than being the emergent and *unintended* outcome of a postconstitutional monetary order that should primarily aim toward removing monetary imbalances at the individual level. NGDP targeting's crude form of exogenously established macro stability might still conceal micro-level uncertainty, microeconomic and expectational instability, and relative price distortions (Cachanosky, 2015). Thus it might not minimize, nor promptly correct, monetary disequilibrium, and, quite possibly, it might even prolong its monetary distortions and exacerbate them through time (Beckworth, 2012a, 2012b).[115]

The results of this institutional analysis challenge the monetary neutrality and expectational properties of NGDP targeting as a fully stable, neutral, and robust constitution. It favors instead—at least preliminarily—a free banking regime that promotes endogenous tendencies toward monetary equilibrium (at the individual level) through a 'productivity norm' (Selgin, 1988). Nevertheless, more thorough examinations concerning the comparative and institutional robustness of NGDP targeting are warranted before making definitive conclusions (Cachanosky, 2019; Murphy, 2013). What is conclusive, however, is that robust (self-reinforcing and stable) monetary constitutions are the only feasible mechanism to transform monetary policy, as Friedman (1994) hoped, from an element of discoordination and mischief toward one of coordination, stability, and human cooperation.

5.5 Concluding Remarks

As seen in this chapter, the Great Recession demonstrated the necessity for robust monetary frameworks that will avoid the recurrence of such catastrophic events. The crisis demonstrated the importance of money in both enhancing and potentially undermining society's rational allocation of resources, and it demonstrated the need to robustly constitutionalize money (Buchanan, 2010). A robust monetary-constitutional system should possess a structure (institutional properties) that provides both the right incentives and the appropriate epistemic-informational mechanisms to generate a common nominal anchor and stabilize expectations. Under robust rules, a postconstitutional environment will guide fallible and short-sighted decision-makers' actions and expectations to create a self-reinforcing type of system.

As Buchanan (1962) argued, even with deviations from idealistic assumptions (omniscience and benevolence), self-reinforcing and endogenous expectations could still meet the predictability criterion. To encourage and maintain society's coordination, there is a need to promote reforms to implement monetary constitutions with the emergent and self-reinforcing stability properties that take into account real public choice conditions and political-economic robustness challenges. Promoting reforms in this direction could potentially reduce societies' exposure to negative expectational shocks, and severe economic crises.

A fundamental conclusion that stems from this chapter is that the supposed fact that economic crises are evidence of the inherent instability and unavoidable maladies of capitalism, rather than the recognizable outcome of specific constitutional and institutional failures, should be severely scrutinized (Calomiris

[115] The fact that both the unsustainable US housing boom and the subsequent misallocation of resources occurred *in* an environment of relatively stable nominal-income growth during 2002–7, and also during a period of low and stable inflation, should make one highly skeptical about top-down stabilizing an *ex ante* and arbitrarily defined nominal-income growth target (i.e. a stable five percent NGDP growth) disassociated from the normal workings of the market system (Beckworth, 2012a; Cachanosky, 2015, 2019; W. White, 2006).

and Haber, 2014). Alas, existing macroeconomic investigations about economic crises and recessions have not systematically emphasized particular institutional fragilities and the robust stability properties required to institutionally avoid them (Hetzel, 2012). This is a severe intellectual gap that this chapter has sought to address.

Contrary to Keynes (1936), Marx (1964, 1973 [1939]), Minsky (1986) and others, I have suggested that economic crises and recessions are not an inherent and unavoidable malady of the market order and of capitalism. Rather, building on constitutional political economy and institutional analysis, I have argued that economic crises and recessions are the outcomes of specific institutional failures of some nonrobust monetary constitutions. Hence, the emergence of severe economic crises is deeply conditioned by the *degree of institutional and political-economic robustness* (or by the fragility) of different monetary frameworks and of how well they can actually maintain stable expectations. Fragile (nonrobust) institutions, such as central banking, systematically allow expectational and monetary shocks to manifest, leading to credibility problems, expectational unanchoring, aggregate-demand instability, and finally deep recessions.

As hinted in chapter 1, money is too important to be exposed to postconstitutional dynamics of political bargains, misaligned incentives, arbitrary forms of decision-making, and human fallibility. The key to insulating the economic system from monetary and expectational disturbances is to ensure a predictable and credible path of monetary policy associated with strong tendencies toward monetary equilibrium. This ensures that the monetary constitution will be effective and robust in regulating (coordinating) sustainable long-term patterns of economic interactions by guaranteeing the stability and predictability of prices and nominal magnitudes as accurate conveyors of market information that would not be accessible otherwise (Horwitz, 2011). Alas, NGDP targeting, despite its robust self-reinforcing properties, falls short of fully achieving the desired neutrality and stability properties of a robust constitution, given its top-down aggregative approach. Hence it maintains a crude aggregated form of expectational stability at the cost of potentially concealing and generating distortions at the micro level (Cachanosky, 2015, 2019; Schuler, 2013).

Nevertheless, embracing a rule of NGDP targeting for guiding and self-reinforcing expectations and stabilizing monetary policy's future path would have been sufficient to avoid the worst deflationary and expectational aspects of the Great Recession. However, that does not mean that NGDP targeting possesses the robust ideal and normative goals of monetary neutrality and the expectational stabilities associated with such neutrality at the micro level. Thus NGDP futures targeting would have been sufficient to avoid the worst deflationary aspects of the Great Recession, but it would not have been enough to avoid other—and less evident—forms of severe monetary distortions and misallocations (such as the US housing bubble), and some other monetary and micro-expectational disturbances. This makes it unable to actually achieve the goal of monetary equilibrium (neutrality) and the associated expectational stability at the micro level.

To conclude, NGDP futures targeting is indeed a more robust institutional arrangement whenever compared to central banks' inherent discretion, fragility, and expectational unanchoring (Sumner, 2013, 2015). However, it falls short of fully achieving the normative monetary and expectational goals that are considered desirable for attaining the *microeconomic* neutrality of money throughout the whole system of monetary relations. Nevertheless, further research concerning, first, the relationship between aggregative stabilities and monetary neutrality and their influence on individuals' expectations and, second, the political-economic robustness and comparative institutional properties of NGDP targeting should be encouraged and is warranted in order to make more conclusive and precise observations (Cachanosky, 2019; Murphy, 2013; Salter, 2013, 2017).

In contrast, as I will argue in depth in the following chapter, free banking seems to promote more robust and better institutional tendencies toward micro expectational stability and micro-level monetary equilibrium (at the individual level), mainly through an endogenous, competitive, and decentralized

process associated with a self-reinforcing constitution (Horwitz, 2000; Salter, 2014b, 2017). Hence, unlike NGDP targeting, free banking seems to maintain and promote or at least move much closer to (micro level) monetary equilibrium and overall monetary neutrality in the whole process of exchange (Horwitz, 2000, 2011). Hence the analytical and institutional relationship between the maintenance of monetary equilibrium at the individual level and the robust institutional properties of free banking, which seeks to correct *local* monetary imbalances, will be the main focus of the following chapter. Consequently, chapter 6 will explore at depth the institutional robustness and comparative properties of free banking and central banking by engaging in a comparative institutional analysis of them.

To finalize, what seems to be undeniable from the analysis of this chapter is that critical thinking on monetary issues and macroeconomics should always be considered within broader political-economy and constitutional concerns. When disregarding institutions and comparative political economy in monetary affairs, societies are not able to discern which monetary constitutions are indeed robust and most appropriate and neutral to the catallactic market order. Consequently, economic crises will continue to manifest (Buchanan, 2010). Unfortunately, as showed by the events of the Great Recession, an intellectual disregard for real institutional and political-economic considerations about money allows macroeconomic instabilities and boom-bust cycles to systematically manifest as *institutionally endemic* and contextualized forms of monetary-policy failures. Thus, broader institutional and applied considerations in comparative monetary constitutions should contribute to reduce future endemic institutional failures and the materialization of severe economic crises. Contributing to this broader, yet pressing, intellectual purpose will be the task of the last chapter.

Chapter 6

The Robust Political Economy of Central Banking and Free Banking[116]

> 'One of the great defects of our kind of monetary system is that its performance depends so much on the quality of the people who are put in charge. . . . That raises a question about the desirability of our present monetary system. It is one in which a group of unelected people have enormous power, power which can lead to a great depression or which can lead to a great inflation. Is it wise to have that power in those hands?'
> M. Friedman, 2007

As argued in the previous chapter, as a consequence of the 2008–9 Great Recession, some economists have been highly concerned with the role of central banks in generating disturbances to relative prices, the general price level, and nominal income (Beckworth, 2012a; Sumner, 2015). But most economists, despite being concerned with cyclical fluctuations and macroeconomic disturbances, deny the necessity of critically evaluating our existing institutional arrangements' robustness (Hetzel, 2012). Hence a broader postcrisis reassessment and scrutiny of our monetary frameworks has been lacking. Chapter 5 argued that the status quo of monetary affairs and of our institutional arrangements (central banking) has actually been reinforced rather than questioned since the Great Recession (Bullard, 2010; Goodhart, 2010). Paradoxically, this reinforcement has occurred despite the fact that central banks have been recognized as playing major detrimental roles in exacerbating both the Great Depression and the Great Recession (Friedman, 1994; Hetzel, 2009, 2012). This work has suggested that this paradoxical state of affairs seems to be the consequence of disregarding practical, institutional and political-economic considerations within macroeconomics.

Chapter 5 suggested that the only way societies can avoid the recurrence of economic crisis and monetary disequilibrium is by engaging in broader political-economic considerations of money and in a comparative institutional analysis of monetary policy. As Buchanan (2010) and Friedman (1994) suggested, only through a comparative political-economic exploration of institutions will societies be able to discern which monetary arrangements are indeed robust and most appropriate for managing monetary policy. A comparative analysis of monetary institutions can illuminate the specific properties and mechanisms different arrangements possess so that macroeconomists can evaluate how, under realistic assumptions, they can manage the money supply in a manner that avoids monetary imbalances and instabilities. That is the task of this, the last chapter of this thesis.

This chapter uses the framework of robust political economy (RPE) to assess whether free banking or central banking can better use its institutional structures and intrinsic properties to minimize macroeconomic disequilibrium and monetary imbalances. As hinted in the previous chapter, robust frameworks leverage their incentive structures, reward–punishment structures, information-disseminating mechanisms, and epistemic resources to achieve close-to-ideal monetary-policy objectives. This chapter relaxes (and challenges) the assumptions of lack of political pressure, lack of self-interest, and also decision-makers' superior knowledge to see which monetary arrangements are more robust in attaining the monetary-policy norm (or goal) of monetary equilibrium at the micro-level.

[116] An abridged version of this chapter was published in the *Review of Austrian Economics* as Paniagua (2016b).

This final chapter uses the framework of robust political economy, introduced in the previous chapter, to engage in a comparative institutional analysis of central banking and free banking. I am here concerned with understanding how well different monetary frameworks can sidestep or overcome both incentive problems (knavery, political capture, and misalignment of incentives) and epistemic limitations (lack of knowledge and information asymmetries) in monetary policy and thus still allow us to avoid monetary mischief and monetary disequilibrium despite deviations away from the ideal assumptions concerning the decision-makers' omniscience and benevolence. To that end, this chapter contributes to developing a broader framework of institutional and banking comparison, drawing elements from both monetary theory and political economy.

This chapter aims also at bringing political economy and applied institutional economics into an area of economic inquiry that has systematically prescribed monetary-policy objectives, identified best practices, and detailed optimality conditions about money entirely through a dismal, 'institution free' sort of monetary analysis. Thus the broader objective is to challenge the current way of thinking in macroeconomics and to question its analysis of optimal monetary policy that proceeds as if institutions don't matter. Therefore, this chapter seeks to contribute to monetary-policy analysis as if institutions really do matter and thus to illuminate the *conditioned* monetary and macro consequences of different banking and institutional arrangements that could manage or guide the money supply.

The institutional and political-economic framework delineated in this chapter could be used to evaluate and compare alternative monetary regimes such as Friedman's *k*-percent rule, the Taylor rule, and NGDP-futures targeting (Salter, 2014b, 2017; Sumner, 2012). Indeed, as Ostrom (1990, 22–23) recognized, the 'particular structure of the institution', meaning both the 'information provided' (epistemic properties) and the 'reward and punishment structures' attributed to different courses of action (incentive properties), can deeply affect the patterns of outcomes achieved under different institutions (Ostrom, 2000, 2005).

In this Ostromian sense, monetary policy therefore is not any different from institutional structures governing the commons or common pool resources since particular monetary frameworks or rules have specific epistemic and incentive properties that determine the patterns of the money supply through time, thus determining also macroeconomic fluctuations. Hence, similar to Ostrom's (1990) analysis, probable macro outcomes of monetary policy and the patterns of the money supply can be fruitfully analyzed through an institutionalist perspective in which the key focus is on the comparative epistemic and incentive properties of different monetary institutions (Salter, 2017a).

Much work remains to be done, and is indeed needed, on the factual institutional analysis and the RPE properties of NGDP targeting (discussed briefly in chapter 5) and other, lesser-known proposals. However, for tractability and simplicity, I here contain the analysis to comparing only two of the most well-known, actually implemented, and studied monetary institutions, free banking and central banking.[117] This self-imposed analytical limit aims only at keeping the arguments both succinct and tractable, and it does not mean that the RPE framework and the institutional analysis delineated here, and also in chapter

[117] A central banking system is a monetary arrangement that entails a national or international centralized institution or bank that possesses a legally granted monopoly of note issuing; the institution possesses either an actual monopoly or a virtual one in guiding the supply of money (Selgin, 1988). After issuance, private banks hold the central bank's notes as reserves in order to expand credit to the rest of the economy. Under this system, liabilities are generally not redeemable in commodities. A free banking system consists of a decentralized competitive arrangement of the money supply and a lack of overarching guidance of it. It is based on the free entry and free competition of banks in the supply of banknotes, which can be redeemed by the public in an agreed form of a good, commodity, or bundle of commodities. Hence 'banks under free banking [will] be free to provide their customers with a range of products and services driven by market demands, rather than political intervention. The most important of these freedoms would be *the ability to supply customers with currency for hand-to-hand use*. In the same way that commercial banks currently produce money in the form of deposits, so would free banks offer the alternative of a bank-produced currency. Such a currency, along with demand deposits, *would require something backing it as a reserve medium*' (Horwitz, 2000, 210, emphasis added). On these issues see also Sechrest (1993).

5, cannot be successfully applied and extended to other monetary institutions and lesser-known rules (Salter, 2014b, 2017; Murphy, 2013).

Building on chapter 5, the objective here is to understand how to achieve a more robust and self-correcting monetary arrangement that also minimizes the likelihood of severe monetary disorder. As suggested in chapter 5, it is normatively ideal to find stable and robust monetary systems that minimize systemic macroeconomic disorder and the emergence of monetary disequilibrium from within the system. Accordingly, the ideal of money neutrality—in the process of exchange and in the formation of prices (Myrdal, 1965 [1939])—consistent with monetary equilibrium serves here as an ultimate wealth-enhancing objective and a theoretical benchmark against which we can compare free banking and central banking under realistic assumptions of political pressure, imperfect incentives, and imperfect information (Horwitz, 2000).[118]

This chapter relaxes (challenges) the ideal assumptions of monetary-policy decision-makers' benevolence (complete lack of self-interest and knavery), freedom from political pressure, and omniscience (complete knowledge concerning monetary conditions). It replaces them with more realistic assumptions of decision-makers' partisanship, political pressure, narrow self-interest, ignorance, and low degree of knowledge and information about the underlying structure of the economy, both in free banking and in central banking. Starting with the idea of monetary equilibrium is important for the analysis of banking institutions; however, *any* institution will be expected to achieve monetary equilibrium and thus function optimally under ideal incentive and epistemic conditions.

If these ideal conditions are simply assumed, then the entire institutional debate in monetary theory—concerning which arrangements are better at insulating the economy from monetary shocks—is dismissed. Thus the whole 'need to choose between different political-economic [and monetary] regimes arises precisely owing to real-world *departures* from idealized conditions; these departures create [critical] frictions that institutions must be capable of addressing' (Pennington, 2016, 518–19). Monetary institutions and their factual comparisons are therefore relevant precisely because we live in an economic world that both depends uniquely upon money (see chapter 2), and is also constantly departing from those idealized human and political conditions (Hume, 2008 [1748]).

Section 6.1 reviews in detail the RPE framework and how it could be a tool for institutional analysis to evaluate monetary frameworks. Section 6.2 addresses the normative benchmark of monetary equilibrium on which to base comparative monetary-institutional analysis. Section 6.3 analyzes the major incentive problems and political pressures that might affect and challenge monetary institutions and monetary policy. Section 6.4 reevaluates and challenges the assumptions concerning the degree of decision-makers' omniscience (complete knowledge concerning monetary conditions) and their wide-ranging epistemic resources (both knowledge and information) within different institutional settings, and reevaluates also how their epistemic limitations could be actually circumvented given specific banking-institutional contexts and competitive interactions. Section 6.5 concludes.

6.1 Robust Political Economy and Nonideal Theorizing in Monetary Theory

Robustness refers to 'a political economic arrangement's ability to produce social welfare-enhancing outcomes in the face of deviations from ideal assumptions about individuals' motivations and information' (Leeson and Subrick, 2006). Notice that such a definition of RPE requires, first, establishing

[118] On the concept of money neutrality, see Lutz (1969). Monetary equilibrium is the normative idea that changes in the nominal money supply should promptly adjust to meet changes in the demand to hold money balances. Monetary equilibrium 'holds when the supply of money is equal to the real demand to hold it at the prevailing price level. . . . [W]e are only in monetary equilibrium if such movements in the demand for money are responded to with changes in the real money supply through adjustments in the nominal money supply . . . and not the price level . . . [T]he primary task of a monetary system is to avoid money-induced changes in the price level' (Horwitz, 2000, 70).

a specific social-welfare-enhancing outcome that institutions should aim at producing and, second, examining how such an objective can be attained in practice whenever the ideal conditions of perfect information (omniscience) and benevolence (altruistic motivations) are not present. Put differently:

> From an RPE standpoint, departures from ideal theoretic conditions reflect certain 'non-reformable' attributes of human agents that create the frictions 'real-world' institutions must address. A first set of frictions arises because people are cognitively constrained and act under conditions of uncertainty where information is often contradictory and where there is a high propensity to err. This problem is not reducible to one of imperfect information that can be remedied by searching out additional data. . . . Rather, they often arise from 'radical ignorance' where agents are incapable of 'knowing what they do not know'. . . . [I]nstitutions must be judged in terms of whether they enable people to adapt to and learn from unanticipated mistakes as well as unforeseen opportunities, and against their ability to reduce systemic or society-wide error. A second set of frictions that an RPE analysis must consider are those arising from opportunistic behavior. . . . Institutions should thus be judged on their capacity to address free rider problems, the generation of third party costs and to constrain power-seeking agents. (Pennington, 2017, 3–4)

Hence, in what follows, I determine the degree to which social-economic institutions are robust or fragile based, first, on the ideal wealth-enhancing (i.e., nondistortive) social goal (here monetary equilibrium) that those institutions should aim at and, second, on how well that social goal could still be achieved if we put pressure on those institutions under worst-case-scenario assumptions concerning lack of knowledge, asymmetric information, frictions, political pressure, and self-interested agents.

The objective is to apply a form of realistic and nonideal theorizing, commonly used in political theory (Hume, 2008 [1748]; Ostrom, 1990; Simmons, 2010), to see which institutional arrangement is in practice better able to move closer to the normative objective of monetary equilibrium. The task then is to evaluate and account for the level of institutional monetary-policy efficiency (the capacity to promptly correct monetary imbalances) we actually see in both free banking and central banking under non-ideal conditions of the human nature.

The contribution of this chapter is twofold. First, it contributes to monetary theory by bridging monetary equilibrium as an ideal goal for policy and an Ostromian form of institutional analysis and nonideal theorizing. Accordingly, it uniquely leverages the celebrated idea of monetary equilibrium (Warburton, 1981) by bringing an approach (RPE) previously unexplored in the macroeconomic literature to the field of monetary policy (see also Salter, 2014b). Second, the chapter engages in an applied exercise in comparative institutional analysis to assess the epistemic and incentive properties and political-economic robustness of both free banking and central banking.

The RPE framework acknowledges that understanding and modeling institutions under the assumptions of perfect knowledge and benevolence is an erroneous framework because it is based on false premises concerning human nature and its endowments (Hume, 2008 [1748]; Ostrom, 1990). Evaluating institutional rules under the wrong assumptions of how individuals act runs the risk of overconfidence and designing weak and fragile institutions. Moreover, 'any institution can be assumed to function well *under ideal conditions*' (Pennington, 2016, 518). However, when ideal conditions are assumed, the institutional framework becomes superfluous (Demsetz, 1969; Ostrom, 1990, 2010).

Instead, political-economic institutions are resilient only if they are able to support the systemic tensions and challenges that continuously arise from human imperfections (Ostrom, 2010). In particular, RPE focuses on symmetrically relaxing two major assumptions—perfect human rationality (full omniscience) and unlimited benevolence (lack of narrow self-interest)—and consequently seeks to understand the *relative* robustness and resilience of different institutions according to how well they promote coordination

and money neutrality even under worst-case and non-ideal symmetrical scenarios.

Here what is critical for a novel and applied monetary-institutional analysis is to avoid the 'nirvana fallacy' (Demsetz, 1969) and hence to maintain *analytical equivalence* and logical consistency whenever comparing and analyzing different institutions (Demsetz, 1969; Pennington, 2011). Thus, the analyst must relax the two aforementioned assumptions of omniscience and benevolence for *all* the institutions being considered and compared. In other words:

> It will not suffice to show how ignorance, uncertainty, collective action problems, unequal power relations, and insufficient generosity lead to 'failure' under one regime type while assuming away or downplaying the same problems under an alternative. To establish a robust case, the analyst must explain *how and why* his or her favored institutional model will be less subject to the [symmetrical] problems concerned given its structural features and how these are likely to interact with nonideal [less-than-fully omniscient and benevolent] agents. (Pennington, 2017, 4)

Additionally, I do not base the case for either central banking or free banking as a robust institution that can maintain monetary equilibrium by assuming that it is actually capable of approaching the ideal of full efficiency or perfect monetary neutrality. The idea is rather to discover, in practice, which institutional arrangement generates, first, better and more accurate information, dynamic learning, and knowledge concerning both existent money imbalances and individuals' actual demand to hold money balances; and second, the correct incentives and reward-and-punishment structures so that policy makers have the appropriate set of motivations to both provide an equilibrating nominal money supply (one that meets individuals' demands) and promptly correct monetary imbalances as they are detected.

The objective is not to discern which monetary institutions are capable of achieving perfect monetary neutrality, since no institution is ever able to attain it in practice. Instead, the purpose is to judge them according to a more modest standard—still guided by the notion of monetary equilibrium—based upon the *nonideal* comparative analysis of which institution is able to generate and communicate relatively more information and knowledge and possesses also relatively superior incentives to change the nominal money supply in such a manner that it can quickly adjust itself to correct imbalances and consequently to move *relatively closer* to the normative state of monetary equilibrium. Thus, an RPE-based monetary analysis attempts to find which system is robust enough to possess relatively superior knowledge, information, and incentives in order to self-correct monetary imbalances better and quicker than the other monetary alternatives.

Simply put, the concern here resides in 'antifragility' (Taleb, 2012), dynamic robustness, and the endogenous capacity of institutions to correct mistakes. Institutions are here compared against each other based on their relative propensities to cope properly with real-world conditions and thus ultimately on their capacities to move closer to the monetary-equilibrium benchmark despite the inexorable presence of those symmetrical and nonideal conditions. Thus, the strongest argument in favor of a given monetary arrangement is not that it will provide perfect monetary equilibrium, but that such a regime is better able to provide a money supply that will correct money imbalances better than the alternatives and thus constantly move closer toward the equilibrium benchmark.

Monetary analysis must consider how arrangements are able to address human imperfections and which specific institutional mechanisms the arrangements leverage to overcome the imperfections and still maintain tendencies toward the optimal monetary policy. RPE suggests that higher degrees of robustness are desirable because, first, they leverage and check economic actors' knavery and reorganize incentive structures so that they can still promote wealth-enhancing outcomes in the form of nondistortive and epistemic-enhancing monetary policies (Horwitz, 2000). Second, they provide the institutional context in which knowledge, knowledge proxies, and relevant information for policy making can be generated and

subsequently communicated accurately to policy makers to enact correct wealth-enhancing policies (Boettke, 1998b, 2012) despite their information asymmetries and cognitive limitations.

This framework, applied to monetary alternatives, informs us how each system is able to alleviate less-than-ideal conditions and how likely it is that it can still maintain the goal of monetary neutrality. Understanding human fallibility allows us to realize how different monetary frameworks are better or worse at promoting economic coordination and maintaining an 'optimal monetary equilibrium'.[119] Both the implementation and technical design of monetary policy and monetary rules, then, should be analyzed. The institutional RPE evaluation shows us how likely different systems are to meet the 'right' demand for money with the 'right' supply of liquidity, minimizing the systemic risk of market discoordination (Horwitz, 2000). A robust framework then should provide feedback and incentives for policy makers to provide a better and timelier supply of money.

Robust monetary arrangements, despite the unavoidable existence of imperfections, still guide the nominal money supply toward a more optimal quantity of money consistent with maintaining monetary equilibrium. In contrast, a fragile monetary system produces a detrimental but politically optimal money supply (Mayer, 1993 [1990]), a non-neutral money supply that reflects a lack of robustness with respect to information problems and incentives, or worse yet, disequilibrating supplies of money and credit that reflect political entanglements or bargains (Calomiris and Haber, 2014). Fragile frameworks therefore deviate from monetary neutrality in the presence of departures from ideal epistemic and incentive conditions instead of leveraging them to improve and correct monetary policy.

6.2 Monetary Equilibrium as a Monetary-Policy Norm for an RPE Analysis

The concept of monetary equilibrium is understood as 'the state of affairs that prevails when there is neither an excess demand for money nor an excess supply of it at the existing level of prices' (Selgin, 1988, 49). Monetary equilibrium describes the ideal condition under which individuals' *actual* money balances are equal to their *desired* money balances (Clower, 1984a). Thus, monetary equilibrium is achieved only when changes in the nominal money supply—and not changes in the price level—accurately meet the changes in economic actors' real demand to hold money (individuals' demand for money as real balances of purchasing power) at the current price level (Horwitz, 2011, 70).[120]

One relevant implication of the concept of monetary equilibrium is that the nominal money supply should vary with changes in money demand so as to maintain nominal-income stability and avoid price distortions (Hendrickson, 2015). According to the monetary theory that follows from the concept of monetary equilibrium, divergences between actual and desired money balances have deep and adverse consequences on welfare, prices, and degree of coordination (Clower, 1984b; Woolsey, 2012; Yeager, 1986). Deviations from monetary equilibrium have negative repercussions for the real economy through declines in nominal spending, prices, and real output (Hendrickson, 2015; Warburton, 1981).

A monetary regime that is able to consistently correct money imbalances and to stay in or *near* monetary

[119] In the following section, I discuss in more detail what I mean by the 'optimal monetary policy'. The idea of monetary optimality is one in which monetary policy and the monetary rule aim at stabilizing nominal income by simultaneously achieving allocative neutrality and avoiding monetary disequilibrium (Hayek, 1967 [1935]; Horwitz, 2000; Salter, 2014b).

[120] Monetary equilibrium is established only if money imbalances are promptly equilibrated through correct adjustments in the nominal money supply. If we consider the real money supply as the ratio M/P, then maintaining monetary equilibrium requires changing only M (the nominal money supply), not P (the price level), whenever there are changes in the demand for real money balances. In terms of the equation of exchange, changes in the money supply (M) should move to offset movements in velocity (V) in order to stabilize the left side of the equation (Hayek, 1967 [1935]). Monetary equilibrium is used as a foil to understand severe disequilibrium processes that arise from the mismanagement of the money supply whenever a monetary system experiences an excess in the nominal money supply or an excess in the demand for real balances (Horwitz, 2006; Yeager, 1986). This framework serves as a theoretical instrument to evaluate different monetary-institutional arrangements and how they are more robust (or fragile) under realistic assumptions concerning human capabilities and hence more (or less) able to achieve a monetary equilibrating environment.

equilibrium creates the propitious environment in which individual markets and money prices can work as well as possible (Hayek, 1967 [1935]; Mill, 1929 [1848]). The main use of the concept of monetary equilibrium here is as a normative benchmark against which we can compare monetary alternatives. On its own, recognizing the relevance and desirability of monetary equilibrium *does not* commit one to any particular monetary institution (Hayek, 1967 [1935]; Myrdal, 1965 [1939]).

Accordingly, monetary equilibrium serves here only as the theoretical core and as the wealth-enhancing objective from which to start before subsequently engaging in an RPE/comparative-institutional analysis in order to see whether free banking or central banking might be more robust at maintaining monetary equilibrium or moving closer to it through time. Indeed, only by comparing and exploring the incentive properties (section 6.3) and the knowledge-generating functions (section 6.4) of different monetary regimes can societies do the same in order to find robust monetary arrangements.

Alternatively stated, 'the primary task of a monetary system is [monetary equilibrium, meaning] to avoid money-induced changes in the price level precisely because they are not costless and they can wreak much havoc on economic performance and long-run growth' (Horwitz, 2000, 70). Following this thinking, I will define what constitutes the individual demand for money and then outline how monetary equilibrium can be achieved whenever the nominal supply of money meets that established money demand. I later in this chapter use monetary equilibrium as the framework in which to reevaluate the incentive and epistemic assumptions of RPE in order to understand which monetary arrangement is more robust in maintaining (or moving closer to) equilibrium.

Thus the ideal of monetary equilibrium as the normative benchmark against which existing and alternative monetary institutions can be judged is here supplemented by *nonideal* epistemic and incentive assumptions concerning human endowments present within those institutions and rules. The central foundation of monetary-equilibrium theory is the role of money as the medium of exchange, meaning that 'goods buy money, and money buys goods—but goods do not buy goods in any organized market (Clower, 1984b, 100; see also chapter 2). Money's unique role as the general medium of exchange means that individuals have to demand money balances in order to hold them so that they can subsequently engage in exchanges. This ubiquity of money in all economic activities also implies that changes in the demand for money, if unmet, will reverberate throughout all markets (Yeager, 1968, 1986). Since money is the unique medium of exchange, it is acquired and held mainly for the purposes of being held and consequently exchanged at some point in the future.

6.2.1. The subjectivist and 'cash balance' approach to individuals' demand for money

The demand for money here is understood under the 'cash balance' approach (Yeager, 1986, 1996), which entails that money demand originally stems from the preferences of individuals within a market economy, based on their subjective predilections to hold a certain amount of purchasing power (Horwitz, 2000). Economic actors possess a subjective preference to hold money according to their private preferences and expectations concerning their needs for purchasing power in the most liquid form, money. Thus if individuals accumulate more money balances—either by refraining from spending or by receiving circulating notes from issuing banks—it reflects their increased money demand. Ultimately, the demand for money is individually based and subjectively held (Horwitz, 1990).

In contrast, whenever individuals spend their money balances, they reduce their money holdings, reflecting a reduction of its demand. Indeed, as Horwitz (1990, 465), building upon Yeager (1986), wrote, 'One can view the choice to hold money as a decision to "purchase" availability [of purchasing power] just as the choice to hold wealth in the form of a book is a decision to purchase book services'. Money therefore provides an economic and social service by which individuals can cope with economic uncertainty by providing a reservoir of purchasing power that is immediately available to them whenever needed (Keynes, 1930). This implies that individuals demand money *to hold* (rather than spend) balances

of real purchasing power (Selgin, 1987; Yeager, 1986).

Consequently, the crucial epistemic challenge for devising a perfectly elastic monetary policy concerns how individuals, within a given monetary framework, can accurately communicate their monetary preferences and demand to the monetary system and, subsequently, how policy makers can change the nominal supply of money accordingly by leveraging the contextualized knowledge, market signals, informational proxies, and incentives present within that particular framework. This crucial challenge of, first, communicating fragmented and subjective preferences to hold real money balances and, second, enacting monetary policy that actually receives correctly such information while also possessing the right incentives to enact the correct type of monetary policy will be the core 'monetary challenge' analyzed in the following sections.

Individuals' cash balances and desire to hold money are determined according to risk and their liquidity preferences (Keynes, 1930; Selgin, 1987), which depend on their expected utility from holding wealth in the form of money or 'purchase availability'. Those actual preferences to hold money balances deeply affect the forms and magnitudes of economic transactions. Thus the 'desired money balances depend, in large part, on the economy's physical volume of transactions contemplated and on the prices at which goods and services change hands. Actual money balances add up to the money supply, and if it equals the total of desired money balances, the flow of transactions continues without monetary impediment' (Greenfield and Yeager, 1989, 405).

As Greenfield and Yeager (1989) acknowledged above, the key is the relationship between the total desired money balances and the actual demand for money. People's actual money balances do not necessarily match their desired demand for money balances. The inconsistency between desired and actual money balances is the main source of monetary disequilibrium and subsequent distortion to relative prices (Clower, 1984a). The concept of individuals' demand for money balances allows us to comprehend the main sources of monetary disturbances that spring from any monetary system's *lack of* capacity in dynamically matching individuals' subjective desire to hold money balances with appropriate changes in the nominal money supply.

Whenever the desired demand for money balances exceeds (or lies below) the actual supply of money, this mismatch creates widespread disturbances at the micro level because money lacks a single market in which it can actually clear (Clower, 1984a, 1984b; Horwitz, 2000). Eventually those monetary disturbances (imbalances) can accumulate, and they will be reflected at the macro level in the form of changes in the pattern of economic activity and nominal income (Friedman, 1994). Individuals' unwanted and unnecessary changes in spending patterns, exchanges, and investment *induced by* the effect of disequilibrium (imbalances) on their actual money holdings (excesses or deficiencies of money balances) reflect actual monetary disequilibrium and are ultimately welfare reducing (Hendrickson, 2015).

6.2.2 The potentially negative consequences of money as the exclusive medium of exchange

As suggested in chapter 2, in a market economy, exchanges are (almost) solely made through money. Money is the counterpart of virtually every single transaction in the market process (Clower, 1984a). Exchanges of goods and services are therefore performed not through direct barter but only through the intermediary of money. As a consequence of this unique role, 'if the demand for nominal money balances at a given price level exceeds the nominal supply of money, agents will try to accumulate money balances and do so through a reduction in spending. . . . [E]ffective demand is lower than notional demand. . . . The reduction in trade as a result of the deviation between actual and desired money balances could be eliminated if the supply of money was greater' (Hendrickson, 2015, 56). Furthermore, 'it is the use of money in exchanges that activates the epistemic properties of the price system' (Horwitz, 2003, 311). It is given these vital intermediary and epistemic roles that the 'money veil' could have the potential to be severely damaging or detrimental to the coordination process and welfare.

In a nutshell, money imbalances are deeply destabilizing to the entire process of exchange because money has no single market of its own and thus has no price of its own through which its imbalances could adjust, dissipate, and clear (Woolsey, 2012; Yeager, 1968, 64). Hence money imbalances, meaning excesses or deficiencies in the supply of money, make themselves felt throughout (potentially) every single market in the economy by affecting both exchanges and prices of all goods and services that are routinely exchanged against money (Clower, 1984b; Yeager, 1986).

The important point about money is that, given the non-Walrasian nature of real markets, unwarranted money-supply changes have heterogeneous and distortive effects upon exchanges and individual prices. This skews the communication of both economic knowledge and underlying real scarcities, curtailing the system's capacity to sustainably allocate resources and activities to their highest-value uses (Horwitz, 2000; Rabin, 2004).

The potentially negative effect of monetary distortions on the epistemic and coordinative role of prices depends ultimately on the degree of robustness by which a banking institutional arrangement supplies money *commensurate* with its changes in demand. Moreover, changes in the demand for money that are actually unmet by offsetting changes in its nominal supply result in detrimental changes in both nominal and real spending that are welfare reducing (Hendrickson, 2015). Thus, different banking institutional arrangements can make money either a market-enhancing institution or a market-curtailing one. More importantly, 'not merely coordination but, more broadly, economic calculation is at stake' (Yeager, 1983, 307).

The definite solution to the monetary-disequilibrium problem mentioned above is to have robust monetary frameworks that dynamically rely on both strong incentive compatibility and accurate epistemologically embedded feedback that together promptly allows the nominal quantity of money to adjust as closely as possible to the fluctuations in individuals' money demand. The objective should be to have robust (meaning epistemologically rich and incentive compatible) monetary systems that can dynamically and promptly correct monetary disequilibria and money imbalances at the individual level as they arise, but only through appropriate adjustments in the nominal money supply rather than by systematically distorting the pattern of exchanges, nominal income, and prices.

Following the analytical relationship between transaction costs and the emergence of institutions (Coase, 1992; North, 1994), both the unavoidable frictions (transaction costs) present in market exchanges and the inexorably fragmented and decentralized nature of trade and bargaining (in the *absence* of ideal, zero–transaction cost, Walrasian markets) create the real-world imperfect conditions in which the institution of money can emerge to sustain and enhance trade in that decentralized and nonideal market reality (Horwitz, 1992a; Howitt and Clower, 2000; Ostroy, 1973). Paradoxically, however, it is that same existence of non-Walrasian markets and the decentralized, nonideal conditions of trade—facilitated *only* through money as the sole medium of exchange—that subsequently creates also the fragmented and fragile conditions in which the potential for systemic coordination failures in money-based markets can indeed arise (Clower, 1984a, 1984b; Hendrickson, 2015; Leijonhufvud, 1981).

It is relevant also to recognize that these potentially negative characteristics by which systemic coordination failures and price distortions can arise are unique to a decentralized *monetary* economy that is also unable to promptly correct deviations (imbalances) between the supply of and demand for money balances (Hayek, 1967 [1935]; Mill, 1929 [1848]; Yeager, 1986). In other words, these negative and fragile coordinative conditions of a monetary market economy are not inevitable, and they can indeed be drastically ameliorated or eliminated if the nominal supply of money is perfectly elastic—meaning, if individuals are capable of accurately conveying and communicating to the monetary system or to banks that there are deviations (imbalances) between actual and desired money balances, and subsequently, if the banking system is also perfectly capable of responding to those accurate money-demand signals by issuing (or withdrawing) money and notes as to correct such imbalances.

The arguments provided by the monetary theory briefly delineated above are relevant because if monetary disequilibrium and coordination failures are always possible within a monetary market economy, which relies on nonideal exchanges and a decentralized market process with subjective and heterogeneous preferences for holding money balances (Clower, 1984a), then the key question for monetary theory really becomes an institutional one, and hence the key question for real monetary policy becomes also a nonideal practical question. The use of money in society, the non-Walrasian nature of markets, and the concept of monetary equilibrium have deep nonideal and institutional implications for monetary theory not entirely explored by the macroeconomic literature.

In other words, the crucial problem resides in the fact that the non-Walrasian nature of markets leads us to rely on money as the only way to overcome the fragmentation, commitment, and bookkeeping (memory) challenges of heterogeneous transactions and exchanges (Alchian, 1977; Kocherlakota, 1998; Ostroy, 1973); however, at the same time, it is the nonideal *combination* of both non-Walrasian markets and the use of money in society that subsequently opens up the possibility of generating severe monetary disequilibrium across all markets that could also deeply affect coordination and exchanges (Hendrickson, 2015; Leijonhufvud, 1981). Paradoxically then, money seems to arise as a mechanism to overcome (or reduce) transaction costs and the fragmented nature of markets (Horwitz, 1990; Menger, 1892); but thereafter, its potential disequilibrium across *all* markets and exchanges could also potentially exacerbate transaction costs and coordination failures, whenever money is 'out of order' or outside the equilibrium between actual and desired money balances.

Thus, as suggested also in chapter 2, the potential coordinative benefits of the use of money in society, to enhance exchanges and to increase the epistemic resources of economic systems, need to be always analyzed within the institutional and banking context that is actually producing and supplying the medium of exchange. For certain monetary and banking institutions could also deeply undermine the epistemic benefits of the use of money in society explored in chapter 2, transforming it into a potential 'double-edged sword' type of coordination mechanism and even a potentially dangerous social device.

Consequently, the noteworthy institutional implication that follows from acknowledging both the real-world, fragmented, and non-Walrasian nature of markets (Clower, 1984b; Jones, 1976) and the unique and ubiquitous role of money as the medium of exchange (Yeager, 1968) is that every monetary institution should dynamically aim at eliminating monetary disequilibria and thus attempt to provide a 'perfectly elastic' money supply (Hayek, 1967 [1935]; Myrdal, 1965 [1939]). This means that monetary institutions should always aim at avoiding making the price level and the price system the adjustment variables to maintain monetary equilibrium in the face of monetary imbalances and changes in money demand. Thus, 'changes in relative prices are the problem with excesses or deficiencies in the money supply' (Horwitz, 2000, 68).

The importance of maintaining monetary equilibrium resides in the fact that it avoids spillover and distortive effects on spending, exchanges, and on the relative prices of goods and services (Yeager, 1983). Hence, 'we do not want the price of money bearing the burden of adjustment in disequilibrium because that "price" can only be changed by adjustments in the prices of (all) other goods and services, the effects of which dramatically undermine economic order' (Horwitz, 2000, 70). This leads one to pay attention to the institutional question of which banking arrangements are most capable of promptly correcting monetary imbalances or both excesses and deficiencies in the demand for money and hence capable of sustaining Pareto improvements in the system of exchanges. This importantly means that capitalistic orders and the process of rational economic calculation must essentially rest on different monetary regimes' degrees of robustness. How different banking regimes adjust the nominal money supply to deal correctly with monetary errors (imbalances) and move closer to monetary equilibrium directly determines also the economy's overall capacity to promote wealth-enhancing and sustainable macroeconomic outcomes.

In conclusion, if market prices are really expressed as money prices, then all the epistemic and coordinative functions of prices directly depend on the monetary regime in which prices are being expressed and formed. A fragile (nonrobust) monetary arrangement that promotes monetary disturbances and money imbalances is pernicious since it 'overtax[es] the knowledge-mobilizing and signaling processes of the market' (Yeager, 1986, 376). The solution hinted in this subsection is to find robust monetary frameworks that leverage (utilize) and cope with our limited and imperfect human nature so that from both our self-interested and competitive actions and our fragmented knowledge, we can still minimize the severity and extent of monetary disequilibria and ensure dynamically their prompt correction.

Consequently, robust monetary frameworks should use and set in motion contextual epistemic signals, communicate monetary information promptly throughout the system, rely on feedback, and provide also the correct incentives to monetary-policy decision-makers, all of which should generate together the institutional banking tendencies (by relying on both accurate knowledge and correct incentives) to dynamically learn and correct monetary mistakes and thus to endogenously move individuals' money balances toward equilibrium. Importantly, institutionalizing these self-equilibrating and corrective monetary tendencies requires both generating relevant contextual monetary knowledge and establishing the correct incentives to promote also the potential for monetary rules to be self-enforcing through decision-makers' own self-interested actions (Salter, 2014b).

6.3 The Incentive Problem in Monetary Policy: Political Pressure and Incentive Incompatibility

Thus far I have largely avoided the question of which monetary regime is more robust and more likely to be successful by avoiding or quickly correcting monetary disequilibria. This is the task of the following two sections, in which I compare the incentive and epistemic properties that both free banking and central banking possess and what they imply for their ability to accurately and quickly correct monetary imbalances and thus to avoid the negative welfare and epistemic consequences of monetary disequilibria. Hence the question I seek to answer, under an RPE-comparative approach, is which regime is more likely to promptly correct monetary disequilibria and hence move relatively closer to monetary equilibrium at the individual level.

The Federal Reserve System was established by the Federal Reserve Act in 1913, with the specific intention to prevent and respond to banking panics (Rockoff, 2015). The Fed and other central banks have shifted their roles from what they were originally. The current notion of an active management of the money supply came only after the Keynesian revolution and the monetarist counterrevolution (Laidler, 1990, 2004). Central banks today are given the power and tools to make monetary policy while in theory being isolated from political pressure.[121] The modern view is that they should guide the money supply with a high degree of 'political independence', which would free them to focus solely on 'technically based' and optimal monetary decisions (Goodhart, 2010; Woodford, 2003).

Setting aside the current technicalities of monetary policy, here I am concerned with central banks' actual incentive structures to see how likely they can pursue and enact a given normative policy optimally. For the purposes of this section, we can simply assume that the Fed's decision-makers are perfectly rational and omniscient and that they have found a technically optimal monetary policy. The relevant question then becomes: how likely is it that policy makers, even if we assume perfect knowledge, will actually pursue and enact these technically optimal policies instead of opting for politically optimal ones?

[121] The Federal Reserve, or any other modern central bank for that matter, does not control the supply of money in the full meaning of the term *control*. What the Fed can do is to promote overarching monetary policies that indirectly impact the banking system's capacity to generate the money supply. Hence the Fed does not directly control the money supply but does possess an extremely important role in affecting it indirectly through different tools such as bank reserve ratios, the discount rate, and open market operations (Horwitz, 2013).

Optimal-policy arguments usually rest on the idealizing assumption of perfect political independence and incentive compatibility. These assumptions have been severely challenged since the advent of public choice theory (Buchanan and Tullock, 1962; Mayer 1993 [1990]) and political business cycle theory (PBCT) (Nordhaus, 1975; Tufte, 1978).

The aforementioned literature has provided empirical and formal models that have shown that under the existent Fed framework, politicians can systematically influence key decisions regarding monetary policy and the growth of the money supply. Hence we are likely to discover biases in monetary policy that reflect pressure from politicians to steer the money supply for their short-term political and economic interests (Nordhaus, 1975; Toma, 2001). Politicians (seeking to promote their self-interest) maximize their own probability of reelection. This opportunistic incentive entails higher potential political pressures placed on the central banks to align the institutions' monetary policies with the incumbent politicians' short-term goals, thereby inducing an inflation–unemployment cycle (Nordhaus, 1975).[122]

Independent central banks might also agree to accommodate politically driven fiscal stimuli from the executive branch to appear to avoid interference in the electoral process and hence avoid radical policy actions during election periods (Drazen, 2001). The PBCT suggests that 'the management of money is always and everywhere political: for every policy choice, there is an alternative that some actors would prefer' (Kirshner, 2003, 645). Political pressure can potentially influence central banking policies to conform to their self-interest. Incumbent politicians seek to affect money aggregates through unanticipated monetary policies to produce short-term political gain (Nordhaus, 1975; Toma, 2001). Empirical evidence (Alesina, Roubini, and Cohen, 1992, 1997) has shown that political pressures have been present and have led to postelection increases in inflation and have affected yearly M1 growth rates before elections.[123]

Grier (1989, 1991) provided additional statistical evidence of strong correlations between shifts of leadership inside the Senate Banking Committee and the growth of the monetary base. Weintraub found through interviews with Fed employees that the 'monetization of [government] deficits was often cited as [a primordial] reason for rapid money growth' (Weintraub, 1978, 359).[124] These findings provide further support for the position that politically optimal monetary policies have systematically dominated technically optimal and neutral policies because of the structure of appointments, oversight, and accountability inherent in the establishment and creation of government-led central banks.

Furthermore, anecdotal historical evidence strongly supports the aforementioned findings. Boettke and Smith (2013, 2015) showed, through a review of several historical episodes, that the Fed has systematically bowed to political pressure both from presidents and from Congress (see also Meltzer, 2009). Overall, the Fed, and most central banks for that matter, is constantly subject to congressional and presidential oversight, political partisanship, and soft political pressure, the last of which manifests itself in the form of political business cycles or monetary disequilibrium more generally, providing in practice non-neutral and non-optimal money supplies.

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[122] Theoretical research on the PBCT has been focused on pre-electoral manipulations with models of imperfect information about incumbents' competences (Rogoff, 1990) and on partisan postelectoral cycles consistent with rational expectations (Alesina, 1987). These models have been tested empirically. For a review of the major results, see Drazen (2001).

[123] But Alesina, Roubini, and Cohen (1997) rejected the existence of both a surge in economic activity and postelectoral inflation after 1979, which somewhat contradicts the models of the political business cycle. They also found more evidence of postelectoral inflation prior to 1979. In addition, Alesina, Cohen, and Roubini (1992) found statistical evidence of significant political effects on the yearly growth of monetary aggregates. These results are consistent with anecdotal evidence of changes of degree of political pressure in different periods (see Boettke and Smith 2013). The point is not so much how constant these relationships of political pressure are as the recognition that they are latent and inherent in the existent institutional framework of monetary policy (Boettke and Smith, 2015).

[124] For a comprehensive literature review concerning the statistical and empirical evidence on political pressure on the Fed and its positive effects and relationships with monetary policy, see Boettke and Smith (2015), Nordhaus, (1975) and the collection of essays in Mayer (1993 [1990]).

The cited literature suggests that central banks' policies are created within a politically influenced context since they adjust to the political-fiscal reality in which they are embedded. Monetary policy reflects nested political entanglements, pressure dynamics, and political bargains (Calomiris and Haber, 2014). This usually entails inflationary biases (Toma and Toma 1986) and easing the federal debt burden (O'Driscoll, 2011). Misaligned political incentives, congressional oversight, presidential pressure, and politically driven bureaucratic appointments can all result in sacrificing social and economic optimality (i.e. the goal of monetary neutrality) for personal, party-related, and political optimality, thereby weakening central banking's institutional robustness.

Thus both the statistical evidence of the PBCT and the historical record (see Meltzer, 2009) suggest that central banks are embedded in a fragile institutional framework that is not able to cope with both the incentive problem (misalignment of incentives between key players) and political pressure. The central banking framework generates deep incentive incompatibilities, does not leverage policy makers' self-interest in the correct direction, and, ultimately, does not insulate policy makers from recurrent political pressure that can severely drive the money supply away from what individuals actually need and demand, thus systematically leading toward monetary disequilibrium due to unavoidable political and fiscal pressure inherent in the structure and dynamics of appointments, party politics, and congressional oversight of central banks.

Centralized monetary frameworks are unable to generate wealth-enhancing incentive compatibility between policy makers, bankers, customers, and politicians (Adolph, 2013). Nor do they have strong accountability and punishment structures and pressures to hold decision-makers accountable so that the policy-makers may quickly learn from their mistakes and promptly correct monetary disequilibria. Indeed, the statistical evidence suggests that central banks have deep-rooted biases toward inflation (Toma and Toma 1986; Wagner, 1986), a form of distortive monetary disequilibrium (Horwitz, 2000, chap. 4), which eventually affects decision-makers' incentives to not correct their mistakes when they arise. Moreover, Beckworth (2012a, 48) pointed out that the 'Fed's inability to handle the implications of the 2002–2004 productivity boom for the inflation rate, [and] the output gap . . . was one of the greatest failures of monetary policy, [but] it was not unique. Rather, it reflected the Fed's [systematic] tendency to ease monetary policy when responding to productivity surges'.

Hence, on the incentives side of the RPE evaluation or scrutiny, under central banking there are no self-correcting tendencies to guide monetary policy toward social optimality and neutrality. This suggests that attaining monetary disequilibrium—due to political pressure—is an inherent outcome of the preconstitutional features (structural bureaucratic and appointment features) of the institutional structure of centralized arrangements and their 'native rules of the game'. Moreover, even if we assume higher degrees of central bank independence (isolation from politics), this concomitantly rules out also political, social, and democratic accountability and any form of robust monitoring and punishment structure on behalf of the monetary policy makers, whenever they deviate from ideal (equilibrating) monetary policies (Eijffinger and De Haan, 1996).

Selgin (2010), in contrast, argued that failure to adhere to optimal (neutral) policies may not be the manifestation of political pressure and self-interest, but simply the willingness of well-intended expert authorities to constantly exercise their expertise through discretionary action. Alas, monocentric arrangements, insulated from competitive and economic pressures, do not leverage correctly the self-interested behavior of all the participants within the monetary rules of the game. Hence in situations of less-than-perfect benevolence—and also because of 'expert' discretion, bureaucratic and power dynamics, inflationary biases, and misinterpretation of productivity surges—optimal monetary policy is never actually arrived at. Such a neutral policy is thus constantly replaced by monetary policy that is highly discretionary and disequilibrating, and potentially politically (bureaucratically) optimal.

Free banking, instead, seems to weakly dominate centralized arrangements, when it comes to analyzing

incentives of all the players involved, under an RPE comparative perspective. In free banking, each issuing bank has strong economic incentives to increase or decrease its quantity of money and liabilities according to economic actors' actual demand to hold their notes and their willingness to redeem them (Selgin, 1988; Tobin, 1963; White, 1989a). Free banking regimes generate incentive-compatible systems in which banking competition, supervising and alert customers, and the wide network for clearing notes guide the self-interested behavior of bankers toward generating an equilibrating monetary policy consistent with monetary equilibrium and money demand (Hendrickson, 2015).

Unlike central banking—in which policy makers act on their inflationary biases, pursue their own visions of the economy, exercise their expertise in a self-interested way, or, worse yet, seek to generate a politically optimal money supply—under a free banking system, individual banks' decisions will always be based on customer considerations (Tobin, 1963). By avoiding the need for a bureaucratic organization, the institutional structure of a free banking system harmonizes the profit-seeking interest of issuing banks and the self-interest of customers, with the socially desirable result of maintaining monetary equilibrium (Selgin, 1988).

Moreover, an interbank clearing system and the redemption process (the law of reflux) provide the correct incentives and punishments so that issuing banks produce a quantity of money just equal to the public's demand to hold those liabilities (Glasner, 1989), thereby approaching monetary equilibrium (Horwitz, 2000).[125] A free banking system nudges money producers and their customers toward generating socially beneficial outcomes that neither party intends to achieve. Under free banking, economic actors' and banks issuers' self-interested behavior leads to a postconstitutional banking dynamic and competitive interactions that have strong tendencies toward maintaining monetary equilibrium by relying on profit-and-loss signals, competition, clearing systems, and checks and balances.

Individuals and bankers within this decentralized competitive framework, guided through robust and aligned incentive structures, lead to dynamic corrections of monetary policy. Under the system of adverse clearings and the redemption process, customers actually hold banks accountable for their monetary supply decisions and punish (economically) bankers for their monetary-policy mistakes and for the issuance of money that does not correspond with customers' desired money demand (Selgin, 1988; Glasner, 1989).

Unlike central banking arrangements, excess supplies of currency in free banking swiftly make their way back to the original issuer through the redemption process as a result of direct demand for its reserves, which pushes the bank's reserve ratio below its preferred level. Indeed, 'only when it has produced a quantity of deposits and currency just equal to the public's willingness to hold them will the bank see no net gain or loss in reserves' (Horwitz, 2000, 211). Furthermore, free banks themselves, in their self-interested pursuit of both profits and market share, hold each other accountable through the system of clearinghouses and the interbank clearing process (Glasner, 1989). Consequently, under an RPE evaluation and comparison of the incentive problem, free banking outperforms central banking in aligning the incentives of both customers and private banks toward quickly correcting monetary imbalances across the banking competitive network.

The incentive structure of free banking assigns personal risks, costs, rewards, and punishments to each banking activity and customers such that the incentive-compatible banks attempt to jointly minimize their liquidity risks, failures, and interest costs. There is an unintended congruity and close relationship between

[125] 'The law of reflux' refers to the principle according to which, in a competitive system with convertibility and redeemable notes, issuing banks cannot maintain an excess issue of banknotes, because any unwanted notes are returned to the issuing banks for redemption, netting, and clearing rather than generating additional levels of spending that would otherwise alter the formation of relative prices and exchanges (Glasner, 1989, 64). Hence 'a bank could not issue more notes or create more deposits than the public wished to hold at the prevailing price level, because doing so would mean accumulating too many debits at the clearinghouse at which the mutual claims of banks were settled. An adverse balance would require the expanding bank to settle its balance with other banks in gold or some other acceptable form of payment' (ibid., 56).

the free banks' profit-seeking and competitive activities and their collective capacity to produce a monetary policy that moves the system closer to monetary equilibrium. In other words, 'their profit-maximizing decisions will unintentionally create a quantity of bank liabilities just equal to the public's willingness to hold them at the existing price level, that is, they will maintain monetary equilibrium' (Horwitz, 2000, 212).

Paradoxically, then, despite banks' knavery and individuals' self-interest, free banks are still led, as if by an invisible hand, to produce a quantity of money just equal to the one the public actually desires. This generates the set of aligned incentives, required economic pressure, and competition among banks and customers so that monetary equilibrium can be potentially maintained, or at the very least, monetary disequilibrium can be quickly corrected.

Finally, free banking arrangements' lack of both bureaucratic structures and political influence sidesteps the negative effects of political business cycles and public choice problems that plague central banks. Politicians, governments, and interest groups are unable to influence the decentralized, competitive market of note issuance and the resulting aggregate money supply since they lack the institutional and legal authority, appointment structures, and congressional accountability to exert political pressure on private banks. By radically disassociating the banking system from state and political intervention, free banking takes governments and interest groups out of the money-supply process.

In doing so, it takes away also the public choice problems whereby politicians and governments use the banking system to monetize their debt and to provide a source of revenue with which to pay interest groups and political clientele. Consequently, under an RPE comparison, free banking weakly dominates central banking in nonideal situations when there are less-than-ideal levels of benevolence (self-interest of both policy makers and politicians) and political pressure (oversight) to manage the money supply.

6.4 The (Monetary) Knowledge Problem: Contextual Knowledge, Adaptability, and Learning

This section evaluates the degree of bounded rationality afflicting decision-makers in different monetary-institutional settings. The goal is to see how decision-makers can sidestep informational limitations yet still contribute to robust outcomes in which their monetary-policy decisions are optimal (equilibrating). Unfortunately, 'more often than not, it is simply assumed that planners can access the necessary information' (Pennington, 2016, 522). In particular, they lack the information about such factors as money demand needed to achieve monetary neutrality and expectational stability. Knowledge that is crucial to make accurate decisions concerning policy and the correct allocation of resources cannot simply be assumed to exist at all times irrespective of context and to be always at the disposal of policy makers (Hayek, 1948 [1945]). We must understand under which particular social and institutional conditions such monetary knowledge can actually be generated and later communicated to policy makers in the first place.

Emphasis should therefore be placed on questioning the assumptions concerning how easily and efficiently society manages, transmits, and encourages the emergence of epistemic resources under different contextual monetary arrangements, thereby levering them to achieve its monetary-policy goals. Robust institutions are those able to both produce and transmit relevant information from different contexts to the specific decision-makers who later utilize it in their 'optimal' economic calculations (Pennington, 2011). Social orders appear to experience a problem of a societal 'division of knowledge' (Mises 1981 [1922]; Gigerenzer, 2008). How well different frameworks cope with this problem determines how robust they are in the informational-epistemic aspect of the RPE scrutiny or institutional evaluation.

Socio-economic institutions that cope with human ignorance and bounded rationality and are still able to generate and disseminate more relevant epistemic resources and subsequently promote wealth-enhancing outcomes are considered robust (Ostrom, 1990; Pennington, 2011). It is the potential *absence*

of local and accurate monetary information about money supply and demand and their imbalances in a centralized and numeric form that is the core aspect of the knowledge problem in monetary policy. Moreover, if we consider the insights from chapter 2 about the fact that relevant knowledge can only arise in certain institutional contexts, then the question becomes in which institutional and competitive banking process—free banking or central banking—such monetary local knowledge (concerning individuals' desired money balances) is more likely to arise and later be accurately communicated to policy makers in order to reestablish monetary equilibrium at the individual level.

My contention in this section is that much of the local and individual monetary knowledge about individuals' demand to hold real money balances that needs to be communicated to monetary policy makers, knowledge actually required to maintain microeconomic-level monetary equilibrium, can only be made available and generated through certain process-dependent, social, and competitive processes. In other words, the crucial knowledge concerning local changes in the demand for money, individuals' desired money balances, and potential money imbalances (deviations between actual and desired money holdings) needs to be revealed and communicated through certain specific social and banking practices that can generate such contextual monetary knowledge in the first place. Subsequently, the institutional banking process should leverage specific social practices and send accurate and timely epistemic signals communicating such knowledge to the relevant monetary policy makers so they can act in an equilibrating and neutral manner.

Banking systems that are able to produce and later communicate these epistemic and informational resources in an accurate and timely fashion to bankers or policy makers will be considered robust under the RPE 'knowledge-problem' evaluation. But absent certain banking properties, institutions and interactive processes that generate the aforementioned monetary knowledge (e.g. the desired demand for money as seen in section 6.2.1), the relevant decision-makers will lack the monetary knowledge and information indispensable to attain monetary equilibrium even if they have all the right incentives (even if we assume benevolence on the part of all economic actors). The potential *absence* of this local and personal monetary knowledge in any accessible, numeric, and centralized form is the main problem that both central banking and free banking must face in order to maintain monetary equilibrium.

As argued in section 6.2, knowledge about individuals' money demand is highly dependent on the context of the postconstitutional market interactions (Horwitz, 1990; Selgin, 1987), and individuals' demand for money itself is ever-changing (Keynes, 1930; Laidler, 1990). Thus, as hinted also in chapter 2, the monetary 'knowledge problem' is fundamentally an institutionally oriented and 'contextual argument' (Boettke, 1998b, 145). With the aid of monetary-equilibrium theory and in light of the subjective and tacit nature of individuals' money demand, we are able to understand the challenging epistemological conditions for generating the money supply that actually meets society's money demand.

Knowledge of the local conditions about the demand for money, as seen in section 6.2.1, is individually based and thus heterogeneous, contextual, and perhaps even tacitly (nonlinguistically) held (Horwitz, 1990; Selgin, 1987). After understanding individuals' complex and subjective formation of preferences for holding money balances (Horwitz, 1990), economists then should avoid assuming omniscience (full information) on the part of monetary policy makers. A *nonideal* theory for monetary policy needs therefore to evaluate how well a centralized institution can actually deal with both the generation and mobilization of local and subjective knowledge concerning money demand and thus the monetary 'knowledge problem' (Lavoie, 1985; Paniagua, 2018c).

Put differently, the same challenge to the assumption concerning how central planners could possibly collect and centralize the relevant facts and individuals' 'fragments of knowledge' necessary to rationally plan an economic order (Boettke, 1998b; Lavoie, 1985; Mises, 1981 [1922]) should be posed with respect to neutral (equilibrating) monetary policy. Indeed, we need to reevaluate seriously the capacity of centralized money-supply guidance and central banks to actually achieve monetary neutrality under

nonideal conditions, given those same limitations of knowledge, informational asymmetries, and lack of 'knowledge surrogates' that deeply afflict centrally planned economies (Hayek, 1948 [1945]; Lavoie, 1985; Polanyi, 1951). The insights about contextual and tacit knowledge and those severe epistemic problems that afflict centralized economies suggest that different monetary institutions possess different contextualized epistemic tools and social processes by which individuals could potentially communicate their demand for money more accurately and promptly and thus contribute to a better-equilibrating money supply.

As suggested in section 6.2, monetary policy aiming actually to achieve the optimal quantity of money to maintain monetary equilibrium would have to rely on individuals' hard-to-extract or hard-to-express monetary knowledge since it is burdensome to obtain or decode individuals' subjectively held knowledge and preferences for holding money balances (Hayek, 1948 [1945]). Put differently, if we take Polanyi's (1958) epistemic claim seriously—and recognize that a large portion of human knowledge may actually be not only individually held and fragmented, but moreover institutionally contextualized and often tacit (hard to express in both numbers and language) (Lavoie, 1985)—then the relevant monetary knowledge, concerning individuals' desires and subjective demand to hold money balances and their dynamic adjustments to imbalances, may *not even exist* outside of certain competitive and socio-interactive banking environments in which a myriad of different interpretations and responses about the individuals' demand for money can be tested against each other. Monetary and banking rules, their specific properties, and the specific interactions among actors that they actually allow are thus extremely relevant to understand how different institutions could in practice ameliorate the monetary knowledge problem.

Additionally, what monetary frameworks can also do, in order to deal with the knowledge problem, is to bypass the direct and explicit need for such tacit and personal monetary knowledge and to leverage instead circumstantial or structural *knowledge surrogates* that might allow (ex post) epistemic bypasses, signals, and information about money imbalances to emerge. In other words, rather than explicitly relying on direct or specific knowledge concerning individuals' subjective and tacit desires to hold money balances and their specific monetary requirements, monetary institutions could use alternative epistemic enablers or indirect economic signals—similar to prices—that might instead communicate information about monetary *imbalances* as they arise *as if* they are actually conveying the personal monetary knowledge of time and place. Economic signals that might convey information about actual monetary imbalances might be able also to transmit somewhat accurate information concerning the relationship between individuals' desired and actual money balances, thus indirectly signaling also monetary disequilibrium.

Indeed, most of the relevant knowledge generated in society, specifically the economic knowledge that individuals hold in their minds, is seldom linguistically and numerically articulated (Hayek, 1948 [1945]; Paniagua, 2018a; Polanyi, 1958, 1966). People's economic knowledge and preferences emerge in specific institutional settings and then get 'transmitted' solely through specific institutional mechanisms and through particular actions or interactions in the form of prices (Hayek, 1973; Polanyi, 1958). Hence, we need to scrutinize and compare the different epistemic and informational properties and the information-conveying mechanisms that different banking institutions possess as they subsequently relate to monetary policy's successes or failures to maintain monetary equilibrium (Horwitz, 2000, chap. 6). The following subsections will explore in depth the different epistemic and informational properties of both central banking and free banking and how they can potentially cope with informational asymmetries and monetary knowledge problems.

6.4.1 Central banking's fragility with respect to the monetary knowledge problem

Central banks usually enact monetary policy based on tracking individuals' demand for money or other aggregated macroeconomic variables. However, various informational lags, informational noise, and knowledge problems prevent them from tracking those variables with great success. Central banking arrangements rely heavily on past measured, aggregated, statistically collected data and on critical

structural assumptions concerning the macroeconomy to build their models (Sumner, 2012). Central banks depend highly upon the centralization, transmission, and interpretation of that data to generate the appropriate money supply (Bernanke and Mihov, 1998; Friedman, 1968, 1994; Woodford, 2003).

Nevertheless, the crucial problem, as I have noted, is that individuals' demands for money (and their desires to hold money balances) largely embody a tacit, individually held, and contextual form of personal and monetary knowledge, rather than being objective statistical data waiting to be collected (Horwitz, 1990; Keynes, 1930; Selgin, 1987). Thus, the fundamental monetary knowledge problem is not only about search costs, informational asymmetries, and data collection, but also about contextualized formation, articulation, and accurate conveyance of such tacit and personal monetary knowledge that cannot be simply assumed to exist as data.

Fundamentally then, the epistemic question becomes: how can central banks respond accurately (equilibrating) to short-term endogenous changes in the demand for money (Keynes, 1930) without suffering the adverse consequences of relying on crude macroeconomic aggregates, second-best economic proxies, and statistical information that is always associated with statistical 'white noise' and severe informational lags (Friedman, 1968, 1994)? Indeed, 'many of the factors that influence velocity are either inaccessible (for example, the tacit knowledge of market actors) or yet-to-be known (for example, a future financial innovation that we cannot now even imagine)' (Horwitz, 2000, 219).

If we recognize that a large portion of economic knowledge does not exist as objective data scattered around the system waiting to be collected as if they were tangible goods, then we can comprehend that the monetary knowledge problem is not only about search costs, but about generating and conveying such tacit and personal knowledge concerning individuals' preferences for holding money balances. Central banks, by relying on structural models of the economy, data gathering, economic surveys, and statistical macro aggregates do not seem to be addressing this fundamental point concerning the generation and articulation of personal and subjective knowledge.

Furthermore, monocentric structures obliterate and replace decentralized socio-economic interactions among agents (e.g., the ones between producers and holders of money), thereby removing the institutional context through which decentralized learning and relevant contextual economic knowledge can be discovered and communicated (Hayek, 2014 [1968]; Ostrom, 1990, 2005). Doing so presents substantial epistemological and informational challenges to monocentric policy makers. In the absence of decentralized and socio-interactive processes, central banks have to rely on some other form of gathering, depurating, and analyzing statistical data about the demand for money. However, if the changes in the demand for money are individually based, and thus fragmented, tacit, subjectively held, and contextual (Selgin, 1987), then they are unable to accurately access such information. That personal knowledge is either not generated in the first place or, at the very least, cannot be linguistically or statistically communicated in a centralized and accessible fashion (Polanyi, 1966).

Simply put, if the monocentric central banking structure largely replaces the cooperative interactions between competitive producers (private banks) and holders of money balances (banks' customers), then policy makers face a severe challenge in generating the relevant local monetary knowledge and banking signals required to maintain monetary equilibrium. As a consequence, their monetary policies have to consist in statistically estimating policy models that forecast how macroeconomic variables such as unemployment, output gaps, and inflation will behave when they implement policies through targeting short-term interest rates (Bernanke and Mihov, 1998). But this aggregated estimation and structural modeling process only exacerbates the informational and epistemic burden on central bankers (Sumner, 2013). In the absence of scattered knowledge signals generated solely by competition and decentralized interactions, how can central banks gain accurate and rapid access to underlying changes in individuals' demand for money?

Central banks have to gather quantitative data and statistical information *after* implementing policy in order to refine and update their structural models of the macroeconomy in light of the new measured and observed changes in the macroeconomic aggregates. Thus they implement monetary policy affecting the future of the macroeconomy, but always by looking backward at the past statistical effects they have actually generated in the economy (Friedman, 1968; Sumner, 2013). Hence to implement an optimal (equilibrating) monetary policy, policy makers must possess reliable and accurate information concerning the *exact way* macro aggregates will react or behave to changes in the targeted monetary instruments (Woodford, 2003). But this kind of forward-looking information is actually absent in the process of *ex post* data gathering and time-consuming economic surveys (Sumner, 2015).[126]

Consequently, if the contextual personal knowledge concerning people's subjective preferences and desires for holding money balances cannot be fully articulated or expressed linguistically, then it simply cannot be part of the measured or observed macroeconomic statistics and surveys (Horwitz, 1990; Selgin, 1987; Yeager, 1968). Consequently, decision-makers, under central banking arrangements, have to rely on second-best data-collection processes, surveys, and other lagged and crude epistemic or statistical proxies (Horwitz, 2000). In other words, and echoing Friedman (1968, 1994), under central banking,

> monetary policy processes are subject to long and variable lags. . . . [I]t may not be until sometime in the *future* when the results of monetary policy enacted in the *present*, based on information of the *past*, become effective. The consequence may well be that what would have been appropriate monetary policy at the point in time described by the data informing the policy shift is now either irrelevant at best, or pro-cyclical at worst. . . . [W]e would like to have a monetary regime that could track changes in velocity, but without the [epistemic] lags. (Horwitz, 2000, 207, 209)

Therefore, central banks, even if we assume they are populated by benevolent agents (assuming away the incentive problem of section 6.3), have to be able to find the perfect macro model of the economy in order to implement optimal monetary policy and update it perfectly at all times with accurate forward-looking data. Central banks therefore seem to rely on too heroic epistemic assumptions concerning a few individuals' capacity to know the one and only 'true model' of the economy and rely on their capacity to correctly and instantly update that model when the underlying economic circumstances and the demand for money change (Sumner, 2013).

Furthermore, since central banks rely on a politically appointed bureaucracy to collect aggregated information and statistics in order to subsequently adjust the money supply, they possess severe informational and recognition lags, 'informational' and 'statistical noise' associated with communicating information through a bureaucracy, and epistemic and political frictions that impede prompt correction of monetary disequilibrium (Friedman, 1968, 1994; Tullock, 1965). These recognition, implementation, and feedback lags—inherent in bureaucratic structures—make for severe knowledge and informational problems that exacerbate monetary disequilibrium rather than promoting their prompt correction (see also footnote 104).

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[126] Indeed, achieving this degree of structural knowledge of the exact numeric way all the macro aggregates will react to changes in targeted rates is highly difficult, if not impossible (Sumner, 2013); especially in complex and nonlinear policy environments that are not regulated by predictable and linear rules (Ostrom, 2010; see also chapter 1). Individuals in a changing policy framework alter their behavior accordingly, thereby undermining the previous stability of such statistical relationships (Lucas, 1976, 1996). Echoing Friedman (1968), Horwitz (2000, 208) for example argued that central banks face three relevant lags in the policy-implementation process. The first is the *recognition lag*, which acknowledges that it takes time for the monetary authority to recognize and observe changes in economic conditions and income velocity. The second is the *implementation lag*, which refers to the extended time frame between recognizing a change in the demand for money and the actual action and implementation of the policy by the authorities. The third lag is the *effectiveness lag*, or feedback lag, which refers to the actual time it takes for any enacted policy to have the subsequent desired effects upon monetary imbalances and for policy makers to later receive such information on its effectiveness. These three practical time lags deeply exacerbate the monetary knowledge problem that central banks face in trying to achieve or restore an equilibrating money supply.

Furthermore, the incentive problem and the inherent structure of a monocentric bureaucracy can *compound* the monetary knowledge problem by severely weakening the direct personal incentives that central bankers might possess to seek the correct and necessary information about local monetary conditions and money imbalances (Boettke and Smith, 2013, 2015; Tullock, 1965). Under 'democratic centralism', based upon a bureaucratic structure in which monetary policy making is determined by a politically appointed group through democratic voting, monetary-policy outcomes are actually disassociated from the central bankers' personal economic costs and reputational risks of potentially generating monetary imbalances and severe disequilibria (Adolph, 2013; Mayer, 1993 [1990]; Wagner, 1986).

As suggested in section 6.3, central banking monetary policy outcomes are determined by party politics, the bureaucratic structure of central banks, congressional influence, and the voting of everyone on the central bank's decision-making board (Adolph, 2013; Drazen, 2001; Grier, 1991). Consequently, individual central bankers might become *rationally ignorant* about local and relevant monetary conditions and actual money imbalances since their personal reputation and incentives for seeking the appropriate monetary information are much weaker, if not nonexistent, within such a politically appointed bureaucracy that engages in group voting (Friedman, 1994; Mayer, 1993 [1990]; Somin, 2011). Indeed, central bankers might actually be more concerned with reelection, political struggles, bureaucratic dynamics, their future banking careers, and producing niche research for their own peers (Adolph, 2013) than actually gathering and detecting the relevant local information about individuals' desired money balances and their real imbalances.

The above strongly suggests that even if we assume that such personal and subjective knowledge about individuals' demand and desire to hold real money balances, their changes, and their money imbalances is actually information that is easily accessible to central bankers—and that such information is indeed scattered around the system as data waiting to be collected—central bankers *still* have close to zero economic incentives to organize themselves and to incur the time and personal costs of speedily gathering, analyzing, and depurating such information since their personal payoffs, careers, and economic benefits are linked to *other* bureaucratic, regulatory, and academic activities rather than associated with seriously correcting monetary imbalances (Adolph, 2013; Drazen, 2001; Tullock, 1965).

Thus, the monetary knowledge problem, even in its weakest form (concerning merely search costs, information asymmetries, and data gathering), might still be insurmountable under a centralized and monocentric bureaucratic structure that does not possess strong economic interactions with the local actors that actually possess such relevant knowledge (Ostrom, 1990; Pennington, 2011). These epistemic arguments delineated above suggest that central banks are epistemologically unable to attain and maintain monetary equilibrium at the individual level—because of the lack of personal and local monetary knowledge present in such monocentric systems—and thus unable also to react quickly or accurately to constant endogenous changes in the underlying data in the market for money balances, in addition to lacking any personal and economic incentives to actually look for and collect such relevant and local information if it is available at all (Friedman, 1968; Horwitz, 2000).

Consequently, under monocentric central banking, economic actors and commercial banks cannot endogenously correct either an excess supply of money and notes (because they lack the institutional mechanisms for its decentralized redemption and for the fast, automatic clearance of competitive notes) or an excess demand for money (because the monopoly issuer or central bank does not rely directly upon the public's decentralized demand and adjustment signals and on signals about the issuing banks' reserve ratios that could in another context convey changes in the demand for money). All these informational and epistemic problems aforementioned are further compounded by a lack of immediate communication, direct interactions, and institutional feedback from individual holders of money balances (the users of money balances) that could communicate back to central banks the presence of monetary disequilibrium or imbalances at the microeconomic level (Horwitz, 2000, 217).

I have suggested that given the lack of certain institutional, decentralized, and competitive processes, the relevant local knowledge necessary to conduct optimal (equilibrating) monetary policies simply *does not* emerge or exist in the existent monocentric institutional framework. This epistemic limit and lack of informational access to the personal and tacit knowledge concerning individuals' demand and desired money balances forces central bankers to rely instead largely on informational and statistical proxies in the form of economic surveys and macroeconomic statistics that are, at the very least, crude, de-contextualized, aggregated and collected only at discrete intervals, and also backward looking and oftentimes even delayed (Horwitz, 2000, 215; see also footnote 104).

Therefore if, as Pennington (2017, 3) stated, the knowledge problem 'is not reducible to one of imperfect information that can be remedied by searching out additional data', then the epistemic and cognitive limitations afflicting centralized monetary policy decision-makers are beyond severe. The crucial epistemic signals and information concerning both individuals' money demand and actual money imbalances, just like other economic signals concerning the individuals' demand for any other goods and services, appear to be *only* available in an accessible form within the framework of decentralized and competitive processes (Lavoie, 1985). This institutional-contextual property of knowledge ultimately makes it impossible for a centralized authority to solve the monetary knowledge problem so as to correct individuals' monetary imbalances and maintain monetary equilibrium.

6.4.2 Free banking's ability to cope with the monetary knowledge problem

The main argument in this subsection is that a free banking regime is better able to cope with the monetary knowledge problem and can generate more-accurate knowledge surrogates to avoid the epistemic challenges that plague central banks. Unlike monocentric central banks, free and competitive note-issuing banks, under a free banking regime, do not adjust the money supply according to gathered statistical data, structural macro models, or in just any way they see fit. Rather, the decentralized supply of money and notes, issued by individual private banks, is based entirely on microeconomic and competitive (supply and demand) banking considerations (Glasner, 1989; Tobin, 1969; White, 1989a).

Under free banking, different private money suppliers compete in note issuance within a decentralized market process based on note redemption. Additionally, free banks are allowed to produce their own brands of currency and notes, and they have also the contractual (legal) obligation to redeem bank money (a form of bank liability) in some base money on demand to customers (Glasner, 1989).[127] Different money suppliers, promptly following the dynamics of competition and contextual market signals of profit and loss, want to identify which quantity of money is the most preferable for heterogeneous individuals at particular points in time. The context of decentralized competition and redemption presents an environment in which those suppliers, following the profit motive, use their entrepreneurial capacities to better estimate individuals' knowledge and preferences for holding money balances even as they fluctuate. Thus, unlike central banks, note-issuing banks have the economic incentives and the reward-and-punishment structures needed to better estimate and learn individuals' underlying demand and preferences for holding money balances.

Free banks, by inhabiting an institutional banking structure of redeemability of notes, decentralization, competition, profit-and-loss signals, and dynamic redemption and clearing of notes, leverage the local context and the dynamic interactions among competing banks and their customers to generate and convey crucial local monetary knowledge and signals that are absent in noncompetitive or monocentric

[127] I am not here concerned with the full and specific details and the full institutional properties of a free banking system, since they have already been explored in depth in the free banking literature (Glasner, 1989; Goodspeed, 2016; Selgin, 1988, 2017; White, 1984, 1989a). For an overview of the historical cases and historical evidence concerning how free banking systems have operated in practice, see also Dowd (1992, 1993, 1994), Schuler (1992), and Smith (1990 [1936]). Readers interested in a formal and mathematical model concerning how a free banking system operates in relations to monetary equilibrium should also consult Sechrest (1993) and Selgin (1994, 2017).

institutional settings. Competing note-issuing banks, through the processes of redeeming and clearing notes and other bank liabilities (whether through redeeming them via clearinghouses or through accepting them from customers in exchange for specie in vault), are quickly made aware—through both the direct redemption and clearing processes—whenever they produce too much or too little money in relation to individuals' desired money balances and effective demand (Tobin, 1963; White, 1989a). They thereby overcome a crucial informational component of the monetary knowledge problem concerning the lack of information and the variable lags and other time and statistical problems that face central banking (see previous subsection).

Thus, just like a capitalist and competitive institutional environment, in which market prices emerge that allow for better social coordination and affluence than in a socialist environment (Hayek, 1948 [1945]; Lavoie, 1985), a competitive environment for supplying and redeeming notes and money allows enhanced epistemic resources and additional knowledge concerning the fragmented, tacit, and subjective demand for money and its imbalances to emerge throughout the system. This allows a myriad of actors, such as banking entrepreneurs and individuals, to be constantly engaged in the process of discovering the correct (equilibrating) quantity of money. In other words, it economically encourages people to adapt to and learn from unanticipated monetary mistakes while seeking also to correct them. Hence, and echoing the socialist calculation debate (Hayek, 1948 [1937]), under free banking, individuals' incomplete, fragmented, and tacit monetary knowledge can be better generated, enhanced, and later articulated throughout the banking system.

Relative to the central banking alternative, the free banking system moves closer toward monetary equilibrium by quickly correcting and remedying most forms of monetary disequilibria through rapid changes in the nominal supply of money rather than allowing changes in relative prices (Selgin, 1988). Particularly, through the symbiotic relationship between the free exercise of issuing short-term liabilities and notes in competition and the economic actors' unconstrained capacity to redeem them throughout the banking network, decentralized private money producers provide their money supply *as if* they actually possess the underlying tacit and fragmented knowledge regarding individuals' personal money preferences, demand, and imbalances (Selgin, 1988). Free banks' information and estimates concerning the public's willingness and desire to hold their notes and money are based on direct and local market feedback, signals, and heuristics that get sent through the changes in velocity and rates at which notes and checks return to them for redemption, either at clearinghouses or at their counters (Glasner, 1989).

Importantly, competitive note-issuing banks use the entire redemption system and clearing processes, meaning: changes in redeemability of their notes and checks in the clearing network, changes in their levels of reserves of the redemption medium, adjustments in their deposit balances held at clearinghouses, and, finally, changes in their preferred ratio of reserves to outstanding liabilities, as a prompt source of *knowledge surrogates* or epistemic enablers (Selgin, 1988; Horwitz, 2000, 219). These banking signals and mechanisms indirectly and nonlinguistically articulate and convey to money producers (banks) underlying tacit, subjective, and individual monetary knowledge scattered throughout the system (Polanyi, 1958, 1966). Free banks then use economic actions (such as spending money, holding money, and redeeming money), competitive interactions among banks (interbank note redemption), and clearing procedures from clearinghouses as tangible ways by which banking activities can articulate and convey relevant tacit knowledge of time and place concerning individuals' ever-changing preferences and needs for holding money balances (Hayek, 1948 [1937]; Polanyi, 1966).

Free banks therefore use the processes of issuing competitive notes and liabilities, redemption of notes by customers at the counter, and redemption of liabilities by other banks via clearinghouses as tangible ways in which economic actions and interactions can first generate relevant economic knowledge and thereafter convey and articulate that hard-to-communicate, or hard-to-extract, personal knowledge concerning the demand for money and desire to hold money balances. Thus by providing the institutional context in which competition, decentralization, and economic interactions among different money issuers

and money holders can exist, free banking also *generates* additional epistemic resources and physical banking mechanisms for conveying personal and tacit monetary knowledge.

Accordingly, free banking also bypasses the aforementioned epistemic and informational limitations of actually knowing in detail the individuals' demand for money and their dynamic personal preferences for holding money balances. Through market and banking competitive processes, then, a free banking system leverages additional epistemic bypasses (enablers) that allow competitive banks to act *as if* they actually possess the relevant and tacit underlying knowledge necessary to attain monetary equilibrium at the individual level.

Importantly, that monetary and tacit knowledge, actually conveyed through banking interactions, clearing, and competition, relates (indirectly) with individuals' underlying demand, imbalances, and inclinations to hold issuing banks' money and liabilities, and it allows the competitive banks to avoid the informational search costs and the epistemic burden of relying on aggregated information, macroeconomic surveys, and statistics and to avoid suffering also the informational lags and statistical noise that they also entail. Put differently, a free banking system, first, avoids (bypasses) the factual need of actually knowing in full detail (in an articulated or numeric manner) the personal and tacit monetary knowledge required to attain monetary equilibrium; and second, it avoids also the need of relying instead on crude aggregated macroeconomic statistics, models, and surveys and consequently avoiding the bureaucratic costs, search costs, and statistical noise and information-lag problems they entail.

Thus, a free bank mainly 'observes movements in its reserve position and interprets those as reflective of changes in the demand to hold its liabilities. . . . [T]he key piece of information the bank needs . . . is present: the immediate effect of its liability issues on its reserve holdings' (Horwitz, 2000, 214). In other words, the constant, incentive-compatible changes in banks' reserve holdings work as epistemic enablers that allow issuing banks to act as if they actually possess the underlying tacit knowledge concerning individuals' ever-changing demand and desires to hold their liabilities. The free banking system—similar to the market system—then provides important and additional monetary knowledge and banking *surrogates* that are entirely absent in monocentric and noncompetitive arrangements.

As hinted in chapter 2 and following Polanyi (1951, 1958), it is only through the use of competition, decentralization, and the socio-economic interactions between money holders, clearinghouses, and note-issuing banks that crucial tacit economic knowledge concerning individuals' monetary imbalances and desired money balances can be both generated and nonlinguistically articulated to banks such that they can move the money supply closer to monetary equilibrium. In other words, the competitive and clearing processes of free banking allow for a system-wide monetary discovery process (Hayek, 2014 [1968]) by which each issuing bank, following the profit motive and correct epistemic signals, constantly discovers the supply of money that meets individuals' desired money balances. Hence, the monetary knowledge problem, similar to the economic knowledge problem (Mises, 1981 [1922]), is greatly ameliorated (Polanyi, 1951).

By relying on direct market-based forms of knowledge surrogates (e.g., movements in banks' reserve positions and clearing), competitive banks do not have to bear the epistemic, economic, and administrative burden of tracking scattered data, enacting surveys, and collecting information concerning the demand for money. Moreover, they entirely avoid the time, the economic costs, the collective-action problems, and the public choice problems associated with coming together and building an entire bureaucratic and state-led technical-expert apparatus.

As suggested earlier in this section, instead of coping with the challenge of achieving monetary neutrality and equilibrium through a monocentric institution that gathers data and searches for economic and statistical information, free banking approaches the monetary knowledge problem by applying similar institutional, socio-interactive, and conveyance principles to what competitive markets apply to solve the

economic calculation problem (Lavoie, 1985; Mises, 1981 [1922]; Polanyi, 1951). Furthermore, in contrast to the central banking system, in free banking those accurate epistemic signals come along also embedded with *aligned incentives* of profit and loss so that banks can actually enact and make the appropriate and corrective monetary-policy decisions based upon that relevant tacit data (Hendrickson, 2015; Sechrest, 1993).

Put differently, the epistemic signals generated in a free banking environment not only provide relevant tacit knowledge and information about individuals' underlying preferences and demand for money, but they also come embedded with the right incentives of profit and loss so that banks can actually respond accurately to those signals. Thus a competitive free banking system enables the capacity of private banks to acknowledge and discover different forms of monetary-policy failures (money imbalances) concerning customers within the banking and clearing network while also incentivizing the capacity of those very same banks to correct them and to promote the discovery of novel solutions to remedy such money-supply imbalances through the rewards of economic profits and market share (Glasner, 1989; Selgin, 1988, 2017).

Consequently, the radical decentralization of monetary policy under free banking is not only epistemologically superior to central banking in the ways detailed above, but also superior to central banking in other epistemic aspects and in potentially generating fewer negative banking externalities and better forms of risk management. First, free banking, by promoting 'skin in the game', minimizes systemic and financial risk and banking panics (Goodspeed, 2016; Paniagua, 2018b, 2019b; Salter and Tarko, 2018; White, 1984) and allows each individual bank to experiment with monetary policy and different data sets, statistical models, heuristics, liability and reserve ratios, and banking procedures so that they can *discover* which macro models and approaches to monetary policy are more suitable to meet individuals' demand for holding money (Selgin, 1988; Goodspeed, 2016).

This increases the banking system's overall epistemic capacity to constantly learn the banking procedures and processes that provide the most equilibrating and neutral money supply. Put differently, a free banking system provides an institutional and competitive setting that could be more conducive than central banking to the discovery of the previously unknown and most equilibrating monetary policy that best satisfies individuals' tacit preferences for holding money balances and banks' liabilities.

Additionally, this decentralized 'monetary policy' discovery procedure works under the logic of 'small-scale experimentation', or 'little bets' (Sims, 2011; Taleb, 2012). That is, it allows for a myriad of 'monetary-policy models' to be tested and implemented while also allowing private banks and commercial 'monetary policy makers' to fully internalize the economic and reputational costs of taking excessive risks and of making monetary-policy mistakes generating either inflation or deflation (Goodspeed, 2016). Fragmented and small-scale monetary-policy experimentation alongside clearinghouse banking regulation and supervision (see chapter 3) allow each private bank to try new procedures, different ways to cope with financial risk, alternative models of monetary policy, and different reserve ratios with low social, systemic, and personal-failure costs but potentially large social and personal rewards whenever the bank gets its monetary procedures and models right (Timberlake, 1984; Yue and Ingram, 2012). Therefore, this self-enforcing and polycentric banking structure increases creativity, competition, and experimentation in monetary policy while encouraging also banking accountability, financial prudence, banking peer pressure, and monitoring. It thus minimizes also systemic risk, banking panics, society-wide errors and monetary social costs (Goodspeed, 2016; Paniagua, 2018b, 2019b).

Furthermore, private 'monetary policy makers' and bankers are very unlikely to fall prey to the dynamics of concentrated benefits and dispersed costs in monetary policy and banking (Calomiris and Kahn, 1996; Paniagua, 2018b; White, 2012). Hence, in choosing the competitive supply of money and credit, free banks are *unable* to generate serious banking externalities and disperse monetary costs to every money holder in the form of inflation or deflation (Glasner, 1989; Selgin, 2010). Hence free banking lowers also

the likelihood that governments, banks, and policy makers will reap personal benefits from banking at the expense of the real economy and the public. A competitive banking system therefore allows and incentivizes (with economic benefits and concentrated banking costs) the discovery of decentralized forms of monetary policy and the supply of money that will eventually meet and adapt to individuals' ever-changing and tacit demand for holding money balances.

The relevant point here is that different monetary institutions vary in how well they will discover the best (most neutral) and most equilibrating monetary policy that is yet unknown to policy makers while also incentivizing banks to reveal and disseminate what they have discovered about monetary policy and individuals' demand for money. The aforementioned leads to the epistemological and institutional question of which are the most suitable banking and institutional arrangements that promote both the discovery (emergence) and the use (dissemination) of monetary knowledge concerning individuals' demand and preferences for holding money balances so as to attain monetary equilibrium. I have suggested in this chapter that free banking seems to possess a relatively superior epistemological, incentive-compatible, and discovery setting in which it can better deal with the knowledge problem.

Banking competition and the clearing network enable feedback, learning, and a heuristic process that dynamically minimizes the system-wide damage, non-neutrality, and monetary disequilibrium brought about by any individual bank's money-supply errors or monetary-policy mistakes (Selgin, 1988, 1994). Consequently, free banking, from the perspective of *nonideal* monetary theory and RPE, weakly dominates central banking arrangements also in the epistemic-informational aspect of the institutional RPE evaluation. Thus this chapter has argued that under real conditions of nonideal fragmented knowledge, information asymmetries, and misaligned incentives, free banking weakly dominates central banking in moving relatively closer to a self-correcting form of monetary equilibrium (i.e. a system with self-adjusting, neutral, and equilibrating money supply).

6.5. Brief Digression on Competitive banking and The Unit of Account

Throughout the literature, many proposals for free banking have proposed also maintain the same unit of account while encouraging decentralized competition and experimentation in self-governance and self-regulation (Horwitz; Selgin, 1988). In other words, free banking proposals have sought to maintain the same unit of account while encouraging a polycentric form of both money issuance and self-regulation. Given the stress earlier on the role of money as the unit of account (see chapter 2 section 2.1) and on its epistemic functions more broadly (see chapter 2, section 2.5), then it is worth briefly mentioning in this section why having a common unit of account might be relevant for a polycentric banking system. Thus, a brief analysis exploring the relationship between the same unit of account and a decentralized polycentric system of banking seems warranted.

As seen in chapter 2, and from a Mengerian standpoint, money's role as the medium of exchange and its role as the unit of account have *coevolved* through time (Salter and Luther, 2014); thus, it's highly unlikely that money's role as the *single* and *common* medium of exchange could ever be divorced from the common unit of account and therefore split into different or diverse units of account (White, 1989b). From a dynamic and decentralized vision of the market, it is the real process of exchange which simultaneously determine prices and the medium of exchange. Consequently, money's role as the unit of account emerges through the process that seeks to establish what the medium of exchange will be, affected also by the political and tax system that promotes a certain unit of account (Salter and Luther, 2014).

In consequence, from both an evolutionary and from a fiscal point of view, it is always easier to allow the coevolving of a single medium of exchange and thus to allow a single and common unit of account to be adopted as well. Also, from a fiscal point of view it much easier for the state to collect taxes and to engage in fiscal responsibilities and debt issuance bny relying on a single unit of account. Moreover, from an epistemic point of view, we have seen in chapter 2 that a single unit of account allows to generate a

coherent and homogenous prices system, in which all the prices and market bargains in society could be expressed in a homogenous 'numeric language'; thus, enabling a wide system of similar-in-kind market relations which sustain the whole process of producing economic knowledge. In other words, having a *common* unit of account related with the *single* medium of exchange is fundamental for any coherent monetary order, either a monocentric or a polycentric one.

Now having settled the question concerning why any monetary order –either monocentric or polycentric— requires a single and common unit of account, the question now becomes: who can define the common unit of account? And, moreover, can we design a common unit of account that can be divorced from the single medium of exchange? I will analyze these questions briefly in the following paragraphs. Polycentric systems of banking, free banking and central banking do not exhaust all the possibilities for establishing a monetary regime. There is the need to recognize that there might be other alternatives such as: first, a banking system based on a gold standard and a 100 percent reserve banking (Rothbard, 1995 and De Soto, 1995); and second, the so-called BFH system (for Black-Fama-Hall) proposed by Greenfield and Yeager (1983) which seeks to create a new unit of account. Given that we are here only concerned with the unit of account in a competitive polycentric system, I will only explore the BFH system in further details.[128]

Greenfield and Yeager (1983) proposed the BFH system in which the main goal is to divorce the medium of exchange and the unit of account. The core idea behind this proposal is to eliminate the problem caused by the fact that money does not have a unique market of its own in which it can clear (Clower, 1984a, 1984b). The BFH system seeks to solve the problem of monetary disequilibria by artificially creating a separate 'money market' and a 'price' for money. In fact, the notion of 'money' disappears from this system, since any financial institution can create any sort of financial media of exchange that people find acceptable. The key however is that prices are all defined in a separate unit of account that is actually defined *outside* the market or the process of exchange. According to this proposal then a competitive banking system could still rely on a single unit of account, but—unlike a free banking system—defined and created *ex ante* by an external enforcer.

Furthermore, Greenfield and Yeager (1983) argue that the unit of account could be defined as the value of a market basket of a few widely traded commodities with substantial non-monetary uses; particularly a wide basket or bundle of commodities whose overall price would remain stable over time. The bundle 'as a whole, would, by definition, have the fixed price of one unit' (ibid., 305). It is relevant to acknowledge also that, under this proposal, financial and banking institutions *do not* need to hold stocks of the basket, as all media of exchange will not be redeemable into the bundle. The proposed bundle will serve only to define or express the common unit of account, 'much as a "meter" is defined by a specific number of wavelengths of the orange-red radiation of krypton 86' (Horwitz, 2000, 220). Hence payments are performed by transferring accepted media of exchange worth however many units of account the good being purchased is priced at. Thus, in a way, this is 'barter [but] not crude barter' (Greenfield and Yeager, 1983, 307).

In theory, the BFH system could virtually eliminate monetary disequilibria by giving money a price of its own in which it can clear and fluctuate. By separating the medium of exchange from the unit of account, the price of the media of exchange can fluctuate *in terms* of the unit if account, but this will not conduce to changes in the unit of account's general purchasing power, which is 'practically fixed by definition' (Greenfield and Yeager, 1983, 310). This enables the specific prices of the different financial media of

[128] Readers interested in a critical appraisal of a gold standard system based only on a 100 percent reserve banking rule, should consult Horwitz (2000, 222-231) and Selgin and White (1996). The fundamental problem of such a system is that it is *inelastic* to changes in the demand to hold money balances. In other words, *given* the current money supply, how will money producers—under a 100 percent reserve banking system—react if customers wish to hold larger balances of bank liabilities? This kind of system therefore will be unable to maintain monetary equilibrium, since this new demand for bank liabilities will not be matched by an increase in the supply of liabilities, thus producing distortive downward pressure on prices and output.

exchange to bear the burden of adjusting out of the changes between the supply and demand for money. In other words:

> This system manages, in theory, to give money 'a price of its own' to react to movements in money's supply and demand so as to avoid the sorts of economy-wide price adjustments that have been the central concern (…) For BFH, the adjustment variable is the 'price' of the medium of exchange in terms of the unit of account. (Horwitz, 2000, 220-221)

As interesting as this theoretical exercise of divorcing the medium of exchange and unit of account is, we have to also examine whether the BFH system can actually work in practice. White (1989a) indeed offers several convincing reasons to believe that such a system might be actually unworkable: first, demand deposits are unlikely to disappear; second, outside money is unlikely to disappear; third and finally, it is also unlikely that the medium of exchange could ever be divorced from the unit of account.[129] As seen in chapter 2, the emergence of the unit of account occurs simultaneously during the process which determines what the medium of exchange will be (they coevolve). Hence, it is hard to imagine, "how such a separation could ever occur as part of an actual historical process, as opposed to a model in which price formation and exchange are treated separately' (Horwitz, 2000, 222).

Moreover, as seen throughout this work, the production of money is a *socially embedded* endeavor that is contextual and institutionally contingent; in other words, money is a social institution that is sustained in certain cultural practices and social processes. Hence money's widespread use and general acceptability are conditioned by the actual preferences, culture and experiences of the citizens who will make actual use of it (Salter and Luther, 2014). Thus, 'simply defining some good or collection of goods as a new unit of account, independent of the trading activities of those who will make use of it, will not be sufficient to ensure its acceptability. … imposed social institutions will not "stick" because they have no basis in actual practice' (Horwitz, 2000, 222). To conclude, even though a well-designed BFH system might look like a good idea in theory, it might be difficult to implement in practice, and to actually promote its "institutional stickiness" whenever designed in an institutionless vacuum (Boettke, Coyne, Leeson, 2008).[130] It is not altogether evident that such a system could be put into operation easily, nor that if it were to be imposed by the state, that there would be sufficient social and cultural substratum for it to generate "institutional stickiness" and thus to be used effectively and widely.

To summarize this brief digression, even though there is a theoretical case for the potential division between the medium of exchange and the unit of account, there several practical problems and institutional questions that remain unanswered by the literature. Further attention should be given to these theoretical debates concerning the unit of account under a competitive banking system. Until further clarifications are due, it seems that the most likely scenario is that the very evolutionary process that enables prices and barter systems to arise, will also 'produce a medium of exchange and unit of account that are wedded to each other. The emergence of money prices, monetary institutions, and a medium of exchange/unit of account are all part of the same Mengerian process of competitive evolution' (Horwitz, 2000, 233). This relationship is also recognized by Selgin (1988) in his proposal for transitioning from the present paper-dollar standard under central banking, toward a system of free banking.

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[129] Due to length constrains I will only and briefly focus here on the alleged feasibility of divorcing the medium of exchange from the unit of account; to explore in further details the other interesting points that White (1989a) raises against the BFH system consult Horwitz (2000, 221).

[130] Recent research on institutional economics have shown that path dependence and culture do matter greatly in establishing and promoting certain types of institutions. Success or failure in promoting certain institutions—and allowing them to "stick"—depends greatly on the history (path dependence) and culture of the agents who will be found under them. Boettke et al., (2008) provide a framework for understanding institutional "stickiness" based on the 'regression theorem'. According to them: 'The regression theorem maintains that the stickiness, and therefore likely success, of any proposed institutional change is a function of that institution's status *in relationship to* indigenous agents in the previous time period' (ibid., 331, emphasis added). This institutional framework then severely questions the likely "stickiness" of proposals such as the BFH system, which have *no prior* relationship with the indigenous agents in previous time periods.

More specifically, Selgin (1988) argues that the:

> existence of a fiat standard is, however, no barrier to the adoption of free banking. As far as banks today are concerned, fiat dollars are base money … What is proposed, therefore, is that commercial banks be given the right to issue their own notes, redeemable on demand for Federal Reserve Dollars … Once the public becomes accustomed to using bank notes as currency, the stock of high-powered money can be permanently frozen … This simple proposal does not involve any interference whatsoever with the dollar as the national monetary unit. … it should be emphasized that, although the above reform is designed so that a continuation of the present paper-dollar standard is possible under it, the reform is not meant to guarantee the permanence of that standard. Some other asset might replace paper dollars as the most saleable asset in the economic system and hence as the ultimate means of settling debts. This would drive the value of paper dollars to zero … rendering the dollar useless as a unit of account. In this event a *new unit of account*, *linked* to the most saleable asset in the system, would evolve, thus bringing the dollar standard to an end. (Selgin, 1988, 168-171)[131]

To conclude, and in regard to the possible evolution of a common unit of account, Selgin's above conjecture seems to be the most likely scenario whenever competition, freedom to issue notes, and a polycentric system of banking are allowed to take hold of the dynamic processes of both money issuance and monetary institutional evolution.

6.6 Concluding Remarks of This Work

As seen throughout part III, recent experiences with centralized institutions that manage the supply of money have proved extremely fragile in maintaining monetary or nominal-income stability (Beckworth, 2012b; Sumner, 2012, 2015). As chapter 5 suggested, the last couple of decades have left us with financial panics, nominal-income instability, and recurrent macroeconomic maladies (Taylor, 2009, 2012; White, 2009, 2012). In part III, I have argued that by reassessing and considering seriously the basic assumptions concerning human fallibility, lack of omniscience, and political pressure, central banking institutions appear inherently disequilibrating and thus fragile from an RPE and nonideal perspective (Friedman, 2007). Economists should recognize that to the extent that economic theory suggests it is problematic and inefficient to have a government-sponsored monopoly or a centralized government agency supplying and producing goods such as cars and shoes (Hayek, 1948 [1945]; Lavoie, 1985), the same skepticism should apply also to centralized government-controlled monetary institutions that seek to guide the supply of money.

Alas, it is important to recognize that monetary institutional arrangements will never be perfect. We live in a social world comprising imperfect human beings and frictions (Coase, 1992; Hume, 2008 [1748]). Thus the institutions arising from imperfect individuals and human interactions are also fallible and imperfect (Ostrom, 1990, 2005). Accordingly, no monetary institution can ever be perfect in the sense that it will always hit a neutral target of monetary equilibrium. Recognizing this unavoidable state of affairs is the foundation for a better understanding of how to move toward robust and optimal non-idealized institutions that constantly promote learning, coordination, expectational stability, and social prosperity. The goal is not to find or design perfect institutions, but rather to discern which ones are comparatively speaking the most robust or antifragile ones (Pennington, 2011; Taleb, 2012).

This chapter has suggested that under the standards of an institutional comparison and non-ideal monetary theory, free banking's institutional robustness outperforms central banking. Free banking

[131] On this issue see also Vaubel (1986), which emphasizes that a successful free banking reform should also entail the elimination of any possible barriers standing in the way of the emergence of new monetary standards and a new common unit of account.

seems to weakly dominate centralist and monocentric systems in both aspects of political-economic robustness (epistemic and incentive properties) addressed throughout this chapter. I have also argued that if monetary equilibrium and monetary neutrality are considered the ideal, optimal, and normative goals for monetary policy (Hendrickson, 2015; Lutz, 1969; Myrdal, 1965 [1939]), then regardless of the institutional or banking system, *all* monetary institutions therefore face two fundamental and insurmountable challenges.

First, there is the public choice challenge of insulating monetary policy makers from regulatory banking capture, short-term private interests, and political pressure and also the challenge of possessing the correct set of incentives (aligned incentive structures) to nudge policy makers to follow monetary policies that can uphold the principles of monetary equilibrium while avoiding also the risks that self-interest and politics will severely distort them. This challenge is what I have broadly defined as the 'incentive problem' in monetary policy.

Second, and perhaps more importantly, there is the epistemological or informational challenge of knowing exactly what is the appropriate and neutral quantity of money desired and demanded by individuals (at any given time) in order to attain monetary equilibrium between actual money balances held and desired money balances (Clower, 1984a; Friedman, 1975). The 'monetary knowledge problem' then refers to the informational challenges of knowing exactly, and hopefully at all times, what individuals' personal and desired demand for holding money and bank liabilities *is* and hence what nominal money supply actually *meets* such changing demand. Put differently, how can monetary policy makers be sure they have indeed attained microeconomic-level monetary equilibrium between actual and desired money balances (or something very close to it)?

Following Polanyi (1958), I have argued that this epistemological and informational monetary challenge is difficult to meet since the monetary knowledge concerning the appropriate (equilibrating) quantity of money that needs to be produced by banks is not known a priori or before the competitive and cooperative interactions between banks and money holders. Thus such knowledge *cannot* be dissociated from the competitive-interactive banking processes unfolding between banks, clearinghouses, and customers. Hence the optimal and neutral quantity of money—like the appropriate and optimal supply of any other good or service—must be discovered through decentralized socio-interactive processes (Hayek, 2014 [1968]). Absent certain institutional and banking features and socio-interactive processes between banks and customers, crucial social and monetary knowledge required to guide rational economic behavior will never exist in the first place (see chapter 2 and Paniagua, 2018c).

Given the two challenges aforementioned, this last chapter has argued that the advantage of free banking is precisely the fact that it leverages institutional features, incentives, the competitive forces of banks, and banking signals to cope with both the public choice challenge and the epistemological challenge in order to produce a 'perfectly' elastic supply of money that actually meets individuals' demand. Thus it 'allows changes in the demand for bank liabilities to "announce" themselves through changes in bank reserve flows and, therefore, bank profitability' (Horwitz, 2000, 233). In contrast, the two other monetary constitutions that I have examined (NGDP targeting and central banking) in one way or another are unable to cope correctly with either challenge when *nonideal* conditions of human nature hold. This work has found that such systems are less robust than the free banking alternative in attaining the wealth-enhancing goals of expectational stability *and* monetary equilibrium.

Overall, the comparative assessment of alternative monetary regimes suggests that among the systems analyzed in this work, only free banking seems to utilize self-interest, align incentives, secure self-enforceability, and transmit diverse epistemic and banking signals as required to achieve expectational stability, constitutional robustness, and monetary equilibrium whenever the epistemic and incentive conditions of the economic actors and politics present within the systems are less than ideal. If monetary equilibrium and monetary neutrality are the normative goals of monetary policy, then in order to obtain

a stable and orderly system of exchanges (Lutz, 1969; Myrdal, 1965 [1939]) monetary theorists should also encourage those monetary and banking institutions that, under nonideal conditions, best allow society to discover the optimal and equilibrating, yet unknown, forms of monetary policy that are actually capable of matching individuals' actual money balances with their desired money balances or self-correcting them when the two do not match (Clower, 1984a, 1984b).

I have argued throughout parts II and III that free banking regimes, or polycentric frameworks of banking more broadly, are best at generating competition and cooperation among issuing banks. They also generate interactions among issuing banks, clearinghouses, and customers that best allow for different banking jurisdictions (such as private banks and clearinghouses as suggested in chapter 3) to dynamically resolve the monetary knowledge problem of attaining monetary equilibrium through the use of competition, decentralized monetary experimentation, and learning (Paniagua, 2019b).[132] All of the issuing banks and clearinghouses are imbued also with the correct incentives of profit and loss.

Indeed, as Aligica (2014) acknowledged throughout his broader work on polycentricity, that resonates also with the epistemic and institutional properties of free banking explored in this chapter (see also chapter 3):

> If experimentalism is a central issue . . . then one can hardly think of a better arena of experimentation than polycentricity. It is a system of reciprocal monitoring and assessment in dynamic interdependence. The various units and decision-making centers depend on each other or compete with each other or both. They must stay informed about (and be prepared to adjust to) the evolutions of other units. (Aligica, 2014, 66)

Considering the major findings of this work regarding both the lack of a strong and intrinsic institutional rationale for central banking (see part II) and free banking's higher degree of political-economic robustness (see part III), it seems reasonable to finally ask: why do we not see more free banking reforms? One plausible answer lies in the fact that political dynamics, private corporate incentives, and interest groups are usually in strong opposition to reforms toward freer, more decentralized, and more competitive structures (Becker, 1983; Stigler, 1971; Zingales, 2012). Indeed, as part II suggested, banking systems and monetary frameworks in general are the emergent institutional embodiment of the broad political system and the dynamic political bargains and entanglements among interest groups, rent seekers, and politicians through time (see also chapter 4 in this thesis).

Consequently, governments, political coalitions, and interest groups 'shape laws, policies, and regulations in their favor—often at the expense of everyone else. . . . [A] country does not 'choose' its banking system: rather it gets a banking system that is consistent with the institutions that govern its distribution of political power' (Calomiris and Haber, 2014, 4). Hence future monetary research should focus also on: the political and constitutional context within which money is produced, particularly the relative robustness of monetary frameworks in the face of political recapture; institutional switching costs; monetary arrangements' comparative robustness with respect to political structures for distributing power; and ultimately, how we can adjust existent monocentric structures of regulatory financial power and the incentive structures of politicians, bankers, and interest groups alike so that sound reforms toward polycentric and competitive forms of banking could be enacted. It is my hope that this entire work, through its emphasis on complexity, knowledge, and the political economy and institutional analysis of money, has contributed to such an important and pressing research project.

[132] Readers interested in the institutional and analytical relationships between a polycentric system of banking and the notion of free banking should consult Paniagua (2019b), Salter (2018), and Salter and Tarko (2018). See also chapter 3 therein.

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